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SUMMARY OF RECENT ABSTRACTS*

IX. LEPROSY

General

Reports of the Fifth International Congress of Leprosy, Havana, 1948, have been published in the *Leprosy Review* (p. 52), and deal with treatment, epidemiology and control, classification and nomenclature, and other matters. The original abstract can hardly be summarized, it is already very brief. The recommendations of the Classification Committee of that International Congress are reproduced on p. 840. The three main categories are Lepromatous, Tuberculoid and Indeterminate, and the definitions of these are given in full. In a correspondence in the *Leprosy Review* (p. 264) LOWE and other workers comment on the new classification, and on the course and evolution of the tuberculoid form. The discussion should be read in full, for very different opinions are expressed.

An account of the All-India Leprosy Workers' Conference, 1948, is included in the journal *Leprosy in India* (p. 943). Most of the points made by the contributors have been published elsewhere, but the whole is a useful statement of modern opinions.

Legislation which would be desirable in relation to leprosy in India is discussed by JOSEPH (p. 374).

Distribution

In Kenya the results of a survey by INNES (p. 638) indicate an incidence of 10·2 per 1,000, highest in the Nyanza area. The total number of patients is probably 35,000, the type of disease is moderately severe, with 20 per cent. of cases of the lepromatous type. Facilities for treatment are scanty. The same author (p. 263) has conducted a leprosy survey of Uganda, during which he examined 14,808 persons and found leprosy in 54 per 1,000. He estimates that there are 100,000 infected persons in the country, with heaviest incidence in the west. This is a higher rate than previous surveys indicated, and it seems probable that a slow increase is taking place. ZANETTI (p. 146) reports on 10 years of leprosy work in the Belgian Congo. Only 12·7 per cent. of the total number of patients seen had lepromatous lesions. He discusses the incidence of other forms of leprosy, and their course and prognosis, but for details the original should be consulted.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1949, v. 46. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

SEN (p. 745) quotes from 0·3 to 1·65 per cent. as the incidence figures for leprosy in Calcutta ; there are probably 20,000 cases in the city and suburbs. In a group of contacts of leprosy patients in Bombay, more than one half showed clinical evidence of the disease, which was confirmed bacteriologically in more than one quarter (FIGUEREDO and DESAI, p. 1052).

In his report on the Central Leper Hospital, Makogai, AUSTIN (p. 638) notes the apparent increase in the incidence of leprosy in the Indians of Fiji, and the fact that the type from which they suffer tends increasingly to be lepromatous. Most of the patients in the Hospital are from the Gilbert Islands, but other islands contribute cases. The author indicates the need for special training of medical assistants in early diagnosis. At the Hospital an extensive amount of food production is carried out.

The occurrence of leprosy in Western Australia is referred to by the Commissioner of Public Health (p. 346). REYE and MAHONY (p. 841) report that there were 52 white patients with leprosy on Peel Island, Queensland, in June 1948. The present state of the disease in Queensland remains virtually unknown.

In Cuba the known leprosy patients number 0·62 per 1,000 and almost half are of the lepromatous type (OTEIZA *et al.* p. 842).

A general account of the incidence of leprosy in Brazil is given by VALLE (p. 1148), who estimates that there are about 84,000 infected persons, with 500,000 contacts.

Aetiology

TISSEUIL (p. 745) has apparently been successful in 3 experiments in which he attempted to infect rats with human leprosy material.

JUAN PUIGGRÓS (p. 46) describes an acid-fast organism which he cultivated from a leproma, which grows slowly on artificial media, and which he regards as a strain of *Myco. leprae*. NAKAMURA (p. 1050) cultivated both human and rat leprosy bacilli in a special medium (of which details are given), and at temperatures alternately of 37° and 25°C. Films showed definite evidence of multiplication, and subcultivation was often successful. Acid-fast organisms have been isolated by ROSSELL (p. 368) from wild mosquitoes experimentally fed on patients with active leprosy in Brazil ; all were chromogenic and multiplied easily on artificial media.

BISHOP *et al.* (p. 476) have examined *Myco. leprae* with the electron microscope, and have compared it with other species of *Mycobacterium*. There are considerable differences in internal structure.

Methods of staining *Myco. leprae* are discussed by ANGEL IBARS (p. 842), who makes certain recommendations, for details of which the original abstract should be consulted. BLANCO and FITE (p. 943) have devised a method of staining leprosy bacilli by a process of silvering, which gives information about the globi which could not be obtained by older methods of staining. The paper, with details of technique, should be read in the original. DE FARIA (p. 1149) has successfully used Faraco's method for the staining of leprosy bacilli in tissues. The essence is that the tissues are treated with some fatty substance to make up for the fat lost during passage through alcohol and xylol, before they are stained by the Ziehl-Neelsen method. In this way more bacilli are visible than by the ordinary Ziehl-Neelsen technique.

Pathology

VEGAS *et al.* (p. 1051) have studied the reticulum which develops in the lesions of leprosy, and which apparently plays an active part in defensive processes.

DE CASTRO (p. 370) has found acid-fast organisms in a mesenteric lymph gland and in the epiploon of a boy with tuberculoid leprosy. There was also

tissue reaction, and the author thinks that tuberculoid leprosy is not confined to the skin and superficial glands, but is a generalized condition affecting all organs.

LAI (p. 148) discusses palpable nerve thickening in leprosy, but observes that nerves are palpable in a large proportion of healthy people, though not so frequently and not so obviously as in leprosy. PARDO CASTELLO and PIÑEYRO (p. 147) have examined nerves taken post mortem from patients with lepromatous leprosy, and report considerable degrees of morbid change in them, including chronic interstitial neuritis and a condition of "pan-vascularitis" in which masses of leprosy bacilli are present. A study of the peripheral nervous system in leprosy is contributed by ALVAREZ LOWELL *et al.* (pp. 46, 1051), who have examined the histological features of spinal ganglia, peripheral nerve trunks and nerve endings. Details should be sought in the original.

VILANOVA and ESTELLER (p. 478) have injected contrast material into the ulnar nerves of leprosy patients and then examined them by X-ray; according to the diffusion of the contrast material certain conclusions may be reached concerning the pathological condition, but interpretation is difficult.

CASTAÑE DECOUD (p. 1051) shows that nerve injury is more serious in tuberculoid than in lepromatous leprosy, and that the nerve destruction which takes place in the former is due to an allergic reaction.

Tests

DHARMENDRA and MUKHERJI (p. 368) have investigated the lepromin test in patients with lepromatous leprosy in whom the disease has subsided. Although there is a tendency towards increased reaction to lepromin after subsidence, the development of a fully positive response is rare. Relapse appears to be less frequent in patients in whom increased response is noted.

DHARMENDRA and JAIKARIA (p. 369) have failed to sensitize to lepromin presumably non-leprous persons by injecting lepromin. They were unable, therefore, to confirm the findings of Fernandez.

MARIANO (p. 749) has found that the "leproline" prepared by de Souza-Araujo is useful in estimating prognosis, and that if injected at regular intervals, it has the property of converting a negative to a positive Mitsuda reaction in lepromatous leprosy. DE SOUZA-ARAUJO (p. 750) has prepared "leprolines" from acid-fast organisms cultivated from leprosy patients or from insects which have been allowed to feed on them, and has used these leprolines for treatment by injecting them intravenously and intracutaneously. The effect in lepromatous disease is to render the Mitsuda test positive, and to produce improvement in the lesions and in the general condition. There is also a good effect in patients with perforating ulcers of the feet.

PEDROSO CRUCET (p. 148) notes that when histamine is injected, normal skin reacts with a weal which itches, but that in indeterminate or tuberculoid leprosy the itching is absent. The same is true when 5 per cent. formic acid is used; this normally causes a burning sensation, but in the skin in certain types of leprosy this sensation may be absent. The test with formic acid, either injected or introduced by puncture through a drop of the material, is useful in leprosy.

ARNOLD (p. 478) has used mecholyl chloride (similar to acetylcholine) for the sweating test, in place of pilocarpine, with success. The test may not be successful in parasitic achromia of the face, in which the sweat response may be absent although there is no leprosy.

KAHN *et al.* (p. 944) show that in lepromatous leprosy serum examination by the Universal Serologic Technique gives marked precipitation.

Clinical Findings

The differential diagnosis between leprosy and various skin diseases is discussed by RABELO (p. 369).

As a result of repeated observations made on the husband of a woman with nodular leprosy, DELPERDANGE (p. 149) was able to diagnose infection in excised lymphatic glands six months before the first clinical signs appeared.

COSTA and ALEXIO (p. 149) describe an unusual case of tuberculoid leprosy in which warty skin lesions were present.

LATAPÍ and CHEVEZ ZAMORA (p. 1053) discuss the form of leprosy described originally by Lucio, which is characterized by diffuse cutaneous infiltration, secondary inflammatory lesions which may ulcerate, and by characteristic response to integral lepromin, which leads to abscess formation at the site of injection.

KIANG and CHOA (p. 746) have studied the anaemia commonly found in leprosy patients in China. It is not severe, and it is often associated with moderate leucocytosis, with high eosinophile, mononuclear and lymphocyte counts.

An account of perforating ulcer of the foot in leprosy has been written by SILVEIRA (p. 47).

CHAUSSINAND (p. 1052) believes that there is some degree of cross-resistance between leprosy and tuberculosis. The subjects of mild tuberculous infections develop a certain degree of resistance to leprosy, and often show a positive Mitsuda reaction. Leprosy patients who are anergic to lepromin have no protection against tuberculosis, and fatal tuberculous complications occur only in anergic leprosy. A gradual eviction of leprosy by tuberculosis is taking place, and is the dominant feature of the relation between the two diseases.

BUDIANSKY (p. 1150) tested children of leprosy patients with tuberculin and lepromin. The Mitsuda test was positive in 94 and 92·9 per cent. respectively of those positive and negative to tuberculin. There seems to be no cross sensitization. When BCG was given, the allergy it provoked disappeared much more quickly in children positive to lepromin than in others negative to it. DE AQUINO (p. 1151) tested with tuberculin a patient with tuberculoid leprosy who was negative to the Mitsuda test. The result was strongly positive, and the patient experienced a vigorous focal reaction in the skin leprosy lesions.

DE SOUZA-ARAUJO (p. 1150) has cultivated tubercle bacilli from the sputum of leprosy patients with tuberculosis, and has found that treatment with streptomycin did not affect them. In addition he cultivated chromogenic acid-alcohol-fast organisms from sputa of some of these patients.

Treatment

Sulphones.—Leprosy is still a major problem in Trinidad and British Guiana, but MUIR (p. 263) found that the effects of sulphone treatment during the last few years had been promising. In the smaller islands of the West Indies reliance is placed on the good effects of the sulphones to attract patients for treatment, and the old leprosy asylums will probably be abolished.

DE SOUZA LIMA *et al.* (p. 49) write favourably of the sulphones. In 584 advanced lepromatous cases there was improvement or cure in all except 4 per cent. In tuberculoid disease the tendency to spontaneous recovery makes it difficult to evaluate treatment, and the same is true of the indeterminate cases, but none of the latter became lepromatous.

FLOCH and CAMAIN (pp. 479, 748) record successful use of sulphones in leprosy, but these compounds were least useful in neural cases with few bacilli. They (pp. 477, 746) report on 300 histological observations in 257 leprosy patients treated with sulphones. They record changes in the tissues and in

the bacilli themselves, especially those situated close to blood vessels, which are more affected by the drugs than those in nerve trunks at a distance from vessels.

ERICKSON and JOHANSEN (p. 50) discuss bone changes in leprosy, which are the result of nerve involvement. For this reason there is little response to drug treatment, but the sulphones seem to have some action on the formation of bone cysts, on osteomyelitis, and on bone absorption. DE DULANTO (p. 47) has found *Myco. leprae* in the bone marrow in lepromatous leprosy. He also studied the myelogram, and suggests that periodical examination of the marrow might be useful in patients treated with sulphones, in that it might indicate impending blood changes.

As a result of an extensive investigation COCHRANE *et al.* (p. 747) show that for oral use sulphetrone is better than diasone, but that if sulphetrone is injected subcutaneously, equal results can be obtained at much lower cost. Ease of administration of sulphetrone gives it an advantage over promin, which requires daily intravenous injection. The parent substance, diamino-diphenyl sulphone, is a powerful remedy when injected as a suspension in groundnut oil, but it tends to produce severe reactions. The authors think that in early lepromatous disease hydnocarpus treatment is the best.

CHATTERJEE (p. 553) has used sulphetrone and diasone by injection, with good results, but suggests that more research is needed to determine the minimum dose that will give satisfactory results. FERNANDEZ *et al.* (p. 480) show that anaemia is common during treatment with diasone, especially if the daily dose exceeds 1 gm. The anaemia is of regenerative type, and always responds to withdrawal of the drug and the use of iron, liver and vitamin B. It is benign, and rarely requires interruption of the treatment. REYES *et al.* (p. 639) have observed a reaction like the Herxheimer reaction, in two patients treated with diasone after previous treatment with chaulmoogra and promin. SOUZA LIMA & CASTRO CERQUEIRA (p. 372) have used diasone by mouth and promin intravenously in lepromatous leprosy, and they confirm the good effects recorded by other workers. The drugs act on the general course of the disease and also on the eye lesions, and on those of the nose and throat. IGNACIO CHALA (p. 552) used promin intravenously with benefit in a few lepromatous patients, but the results in neuromacular leprosy were not good. Lepromatous nodules may be treated successfully by intradermal injection of a 40 per cent. solution of promin. HERRERA (p. 1053) gives details of dosage and technique. ZAVALIA (p. 1151) treated with promin a number of patients who had lepromatous leprosy and lesions of the eyes. In spite of regular injections many of the eye lesions progressed, and the author concludes that promin will not arrest or delay the development of these lesions.

CHOVER MADRAMANY (p. 844) reviews a number of cases in which tracheotomy was necessary in leprosy, and gives his opinion that promin is almost a specific for leprous laryngitis. The great value of the sulphones in laryngeal leprosy is described by SLOAN (p. 479), who regards this as perhaps their most striking effect. The need for tracheotomy is greatly reduced, and in some patients in whom it has been performed the condition has improved so much under the sulphones that it has been possible to remove the tube.

HINGSON *et al.* (p. 51) have used the " hypospray " for injection of sulphones and other substances in leprosy. This instrument injects the solution from an extremely fine nozzle, at very high velocity, and under great pressure.

Chaulmoogra and Other Substances.—ROTBERG and BECHELLI (p. 371) analyse the results obtained in the treatment with chaulmoogra of 679 patients with the lepromatous form of leprosy ; the greatest number deteriorated under this treatment, even though intramuscular and intradermal injections were given at the rate of 100 cc. of the esters in 10–30 weeks, repeated. The same

authors (p. 370) analyse 2,201 patients according to types of lesions. On the other hand, SCHUJMAN (p. 843), after reviewing results of treatment in lepromatous leprosy, concludes that treatment with chaulmoogra (20–30 cc. each week for 2 years) gives as good results as treatment with promin, but that it is essential to give adequate doses over a long period. If these two treatments are used alternately there may be even better results. He (p. 48) has compared the efficacy of chaulmoogra in high doses, and promin. The results after 18 months of treatment were similar, but chaulmoogra caused more discomfort than promin.

COCHRANE (p. 48) agrees with Schujman (above) that hydnocarpus preparations should be given in high doses (up to 400 cc. in a year) and by the intradermal route, if success is to be achieved. The optimum dose is 15 cc. of the oil per week. The author confirms the good effects of the sulphones, especially sulphetrone, but close daily observation of the patients is necessary. He has used sulphetrone in arachis oil and beeswax for injection, and found this much more economical than administration by the mouth. He advises sulphones only in advanced lepromatous cases or in those not improving on adequate hydnocarpus treatment. FLOCH (p. 371) brings out the importance of prolonged and regular treatment with intramuscular chaulmoogra preparations ; regular weekly injections are needed for a minimum of 3 years. Investigations indicate that with hydnocarpus preparations, a combination of intradermal and subcutaneous injections of moderate doses (up to 15 cc. each week) gives the best results (RAJAH *et al.*, p. 370).

CHAUSSINAND *et al.* (p. 372) have used streptomycin with chaulmoogra in lepromatous leprosy, without evidence that the former had any value. A patient with lepromatous leprosy was treated by GRILLO (p. 749) with streptomycin in doses of 2–4 gm. After a strong febrile reaction the lepromata showed progressive improvement, and morphological changes were seen in the bacilli. The total dosage given was 360 gm.

CAPURRO and GUILLOT (p. 640) used vitamin D2 in the treatment of a few cases of tuberculoid leprosy, apparently with very good results. They were led to do so by the favourable effect this vitamin has in lupus.

LASSMAN (p. 944) show that oil extracted from the seed of *Caloncoba* has considerable effect on lepromatous lesions when infiltrated locally and injected intramuscularly.

Treatment of lepromatous disease with Bogalita, a reducing substance, produced some improvement (STANCIOLI and DINIZ, p. 944).

Having noticed that in female patients with lepromatous leprosy the lepra reaction was often closely related to menstruation, GUILLOT and CAPURRO (p. 1053) treated patients with testosterone propionate injections on the 8th, 15th and 20th days of the menstrual cycle, with some success in preventing reactions.

GUADAGNINI (p. 1152) describes the beneficial effect of surgical intervention on enlarged peripheral nerves in leprosy. The effect is to relieve pain and to improve function in the early stages, though in the later stages when there is no pain and function is lost, the operation is not helpful. It consists in freeing the swollen nerve from its sheath and the fibrous epi- and endo-neurium.

SAGHER and FRANCO (p. 51) have treated lepromatous leprosy by means of X-rays, and report distinct improvement.

Physical treatment of patients crippled as a result of involvement of nerves in leprosy is discussed by ALDERSON (p. 265), who writes of the value of exercises, heat treatment, massage and occupational therapy. This has been started in Nigeria, but the author remarks that physical treatment has been neglected in British tropical countries.

Control

Although it has commonly been supposed that infants and children are more susceptible to leprosy than adults, BECHELLI and ROTBERG (p. 1149), who have studied incidence in relation to age and exposure to the disease, think that the degree of exposure is a more powerful factor than age.

Lepromatous leprosy is much more infective than the other forms, but only about 20 per cent. of leprosy patients have that form. SIMONS (p. 374) shows that the older procedure of segregation of leprosy patients regardless of the type of disease was unjust, and unwise in that it led to concealment. Leprosy is a disease of low infectivity largely spread in families ; only lepromatous patients should be isolated. TEICHMANN (p. 45) writes of the value of separation of children from leprous parents, quoting figures of incidence from Children's Homes in India and comparing them with incidence in children not separated from leprous parents.

FIGUEREDO and DESAI (p. 373) write of the importance of home visits in the control of leprosy in Bombay.

DE SOUZA CAMPOS and BECHELLI (p. 682) discuss the organization and management of preventoria in relation to leprosy, in a monograph published in the Portuguese language. They deal with the problems raised chiefly as they affect Brazil, but their views are applicable to other countries. This is a long monograph, and details cannot be given, but a full indication of the contents is included in the original review. An account of the development of dispensaries for leprosy in Brazil is contributed by SOARES (p. 53).

MCCOY (p. 375) discusses leprosy as it exists in the United States ; he thinks that segregation of non-infective patients should not be attempted, but that there should be special hospitals for the infective patients.

Rat Leprosy

ROW (p. 264) has cultivated an acid fast organism from the spleen of a mouse infected with rat leprosy, which had been exposed within a Chamberland filter bougie to substances diffused through the bougie from a fluid culture of *Myco. tuberculosis*, and then planted out on potato medium. He (p. 1054) states that he has cultivated on glycerin potato acid-fast bacilli from a mouse inoculated some months previously with rat leprosy material.

GOMEZ (p. 945) has treated rat leprosy with promin, and has observed that one effect of the treatment is to produce apparently degenerated forms of bacilli.

CHAUSSINAND *et al.* (p. 375) after extensive trials, conclude that streptomycin is not active in rat leprosy. *Charles Wilcocks*

MALARIA

PARROT, L. & CATANEI, A. Les éléments de mesure du réservoir de virus paludéen. [**Methods of measuring Malaria Endemicity.**] *Arch. Inst. Pasteur d'Algérie.* 1950, Mar., v. 28, No. 1, 71–92, 9 diagrams. [10 refs.]

This article has been written primarily for students and doctors but little versed in malariology. It stresses the importance of a detailed malaria survey as a prelude to any enterprise in a malarial country, or to the inauguration of any antimalarial campaign. The first step in such a survey is the study of the

amount and nature of human malaria infection. Spleen rates, spleen measurements, parasite rates, the intensity of infections (plasmodimetric index), gametocyte rates etc., are all explained and their utilization is exemplified.

Norman White

DAKSHINAMURTY, S. **Measurements of Malaria. Part II. Simple Statistical Technique.** *Indian J. Malariology.* 1948, Sept., v. 2, No. 3, 129–56, 8 diagrams.

The author describes in simple and readily understood language the elements of statistical technique commonly useful to the malariologist. The paper covers the tabular and diagrammatic presentation of data ; measures of position including mean, median and mode, rates and percentages ; the standard deviation and coefficient of variation ; and the coefficient of correlation and regression.

The author does not attempt to elaborate theory but to give a plain presentation illustrated with graphs and numerical examples. The instructions given are adequate and should go a long way to achieving their objective, to persuade the malariologist to make a more rational use of figures than has been generally the case.

G. Macdonald

BERN, H. A. & HANSEN, M. F. **Parasitic Infections among Natives of the North Markham Area, New Guinea.** *J. Parasitology.* 1950, Apr., v. 36, No. 2, 103–6, 1 fig.

There is a proposal to form agricultural settlements in the valley north of the Markham River [6°34′S, 146°46′E] in New Guinea. Preliminary medical survey demonstrated the following incidence of infections in the area :—

Infection	Subjects Examined	Incidence per cent.	Subjects Examined	Incidence per cent.
Malaria parasites :				
P. vivax	children	21·6	adults	4·6
P. malariae	,,	18·5	,,	8·5
P. falciparum ...	,,	18·9	,,	5·2
Doubtful and mixed	,,	6·9	,,	7·1
All species (Parasite Index)	,,	60·4	,,	25·4
Microfilariae :				
Wuchereria bancrofti	adults (night films)	30·0		
	adults (day films)	2·2		
Hookworm	mixed adults and children	80		
Trichuris trichiura ...		10		
Ascaris lumbricoides...		4		
Strongyloides stercoralis		3		
Multiple infections ...		12		

The frequency of *Plasmodium* species varied greatly from village to village. The *Anopheles punctulatus* group is well represented. Three known vectors of filariasis were collected, *Aëdes scutellaris*, *Culex annulirostris* and *Mansonia uniformis*. The health hazards in this area cannot be ignored.

G. Macdonald

SWELLENGREBEL, N. H. **The Parasite-Host Relationship in Malaria.** *Ann. Trop. Med. & Parasit.* 1950, Apr., v. 44, No. 1, 84–92. [15 refs.]

Professor Swellengrebel considers the meaning of parasitism and the adjustment of the parasite to its host, which reaches its perfect stage when the parasite survives without detriment to the host ; a state exemplified by piroplasmosis of cattle in the south-eastern United States, and characteristic of fully developed premunition. He enquires whether there is any place in the world where perfect balance is established between plasmodia and man, and considers the possibility of its occurrence in Africa, Surinam and India. GARNHAM [this *Bulletin*, 1949, v. 46, 1113] has produced evidence from which the author feels " justified in concluding that the relationship between host and parasite in the Luo tribe was as normal as that between the home-bred cattle and the Piroplasmas in the southern United States."

In the interior of Surinam Professor Swellengrebel encountered a group of bush negroes among whom reliable vital statistics had been maintained by a priest for 12 years. The group was very malarious, the spleen rate being 90 per cent. in infants, and 20 per cent. in adults. The predominant parasite was *Plasmodium falciparum* and the proportions positive were :—four-fifths of the infants, nearly all the young children, three-quarters of the older school children, half to a quarter of the older age groups. Clinical malaria was rare and only three per cent. of the attendants at the clinic were suffering from the disease.

" From 1927 to 1939 inclusive the population had increased from 698 to 901 ; 201 people had died—an average death-rate of 21 per thousand—and 380 children had been born, of which 43 had died within a year of birth—an infant mortality of 113 per thousand live births. (These are figures of which we should these days be thoroughly ashamed, though we unblushingly produced them in Holland in the 10 years from 1881 to 1890.) Of the children aged from one to five years, 28 died at the age of one, and eight at the ages of two, three, four and five years respectively.

" Here, then, in a people of the same race as Garnham's African tribe but living in another continent, are parasites and adults living harmoniously together, the parasites greatly reduced in numbers and the adults showing a slight degree of splenic enlargement. This equilibrium is reached at the price of a period of severe parasitaemia in the children, which nevertheless does not affect them to the extent of markedly influencing the infantile or general mortality. We may therefore consider these findings as confirmatory of Garnham's, that man and the Plasmodia can show a host-parasite relationship as perfect as that of the home-bred cattle of the southern United States and the Piroplasmas."

After considering the extent to which this state is approached but not reached elsewhere, Swellengrebel advocates the treatment of cases to keep parasites at a low level rather than to eradicate them, and states that in Africa, in places where the balance is achieved, *Anopheles* control should not be undertaken unless one is prepared to continue the work indefinitely or until the vector species has been totally eradicated, without a chance of reimportation from abroad.

In conclusion he considers that the perfect balance depends on a highly efficient insect vector and a high degree of tolerance, which latter may be due to racial, social or economic conditions.

[Despite Professor Swellengrebel's satisfaction with affairs in Africa and Surinam the subject remains controversial. Garnham's studies included 57 autopsies on children, in 18 of which he was certain that malaria was the cause of death, and in four of which he considered it the probable cause. In the

Surinam series 95 out of 430 children, 22 per cent., died before reaching five years of age. Death rates for each of the first five years of life calculated from Professor Swellengrebel's data and in a similar manner (fate of children born in 1943, followed for five years) for England and Wales are :—

Age	Death Rate (per cent.)		Ratio
	Surinam	England and Wales	
0	11·3	4·9	2·3 : 1
1	8·3	0·46	18 : 1
2	2·6	0·24	11 : 1
3	2·7	0·15	18 : 1
4	2·7	0·12	25 : 1

There is clearly a great discrepancy, some of which may be due to the error of small samples. It would be surprising if there were no difference, but it is not clear how any one disease is absolved from blame for any part of the gross excess in Guiana. The Surinam figures are very comparable to those of India, where malaria plays an acknowledged large part in mortality.]

G. Macdonald

BRISCOE, M. S. **Field Notes on Mosquitoes collected in Liberia, West Africa.** *Mosquito News.* 1950, Mar., v. 10, No. 1, 19–21.

HADAWAY, A. B. **Observations on Mosquito Behaviour in Native Huts.** *Bull. Entom. Res.* 1950, May, v. 41, Pt. 1, 63–78, 3 figs. on pl.

Further experiments on the entry of mosquitoes into and departure from African huts in Uganda are described. No increase in the number of mosquitoes attempting to leave huts treated with DDT was observed but a proportion of these had not acquired a lethal dose.

Studies were made in a series of thatched mud huts, one sleeping African and one searcher were present in each hut as bait. Captures made at intervals of two hours throughout the night produced nearly 2·5 times as many mosquitoes and over three times as many *Anopheles gambiae* as did captures in the morning only. Sixty-three per cent. of all resting mosquitoes and 79 per cent. of *A. gambiae* were found on the roof. Entry of females of *A. gambiae* continued throughout the night with a peak in one series at midnight and in another at dawn. An influx of males of *A. gambiae*, presumably to seek shelter, occurred at dawn. Mosquitoes leaving the huts were caught by the occlusion of the windows with slit traps for periods of two hours so that these were in place for six out of the twelve hours of darkness. Seventy-four per cent. of *A. gambiae* were found to stay for more than two hours in an untreated hut.

One hut was then sprayed with a 5 per cent. water suspension of a DDT wettable powder, Neocid B.A.50, to give a dosage of 285 mgm./sq.ft., another with a 5 per cent. solution of commercial DDT in kerosene, giving an average wall dosage of 72 mgm./sq. ft. and a third was kept as a control. Percentage survival rates of those caught in the window traps, *i.e.*, those attempting to leave after having entered the huts more than one hour and less than two hours

previously, and of those caught still in the huts, *i.e.*, that had not attempted to leave during the same period, are given below :—

Weeks after spraying	DDT-Suspension		DDT-Kerosene		Control	
	Survival in hut	Survival in trap	Survival in hut	Survival in trap	Survival in hut	Survival in trap
2	0	0	79	78	97	93
10	11	31	—	—	—	—

It is clear from this that in the early weeks after spraying with a watery suspension there is no difference in mortality between the traps and huts, and no clear evidence of an excitatory action of DDT. However, in the succeeding weeks a notable proportion of mosquitoes are leaving without having acquired a lethal dose, although in these experiments no evidence was found of activation by DDT causing more mosquitoes to leave a treated than an untreated hut. There were, unfortunately, insufficient numbers of *A. gambiae* for analysis, the majority of mosquitoes being *Taeniorhynchus fuscopennatus*.

Experiments were also conducted to study the behaviour of fed *A. gambiae* females released into huts treated in a similar fashion. There was observed " a tendency for more mosquitoes to enter the traps of the treated huts than of the untreated one, but the figures are insufficient to show a significant result ". The majority of these mosquitoes leaving and caught in window traps had not acquired a lethal dose, although none were alive in the huts twelve hours later. An effective residual action was still apparent 17 weeks after spraying with both DDT preparations and twelve weeks after application of " Gammexane " wettable powder. *M. T. Gillies*

Sasse, B. E. & Hackett, L. W. **Note on the Host Preferences of *Anopheles pseudopunctipennis*.** *J. National Malaria Soc.* 1950, June, v. 9, No. 2, 181–2.

" A stable trap baited in rotation with four different animals and a man was operated nightly for 12 weeks in a malarious village of coastal Peru. *A. pseudopunctipennis* preferred any of the common domestic animals to man, and the donkey to other animals."

Schneider, J. L'atteinte hépatique au cours du paludisme. [**Hepatic Involvement in Malaria.**] Reprinted from *Bull. Méd.* 1950, Feb. 15, No. 4, 16 pp. [17 refs.]

Primary attacks of malaria are sometimes characterized by nausea, vomiting, epigastric pain, or pain in the right hypochondrium. The liver may be enlarged. Transient jaundice may occur. Such symptoms respond rapidly to antimalaria treatment. Exceptionally such liver derangement may dominate the clinical picture, the bilious fevers, intermittent or remittent or continuous : such attacks may be extremely grave but with prompt specific treatment the prognosis is always good.

Functional disorders of the liver occur in acute malaria without giving rise to any clinical symptoms. The author studied 44 cases of naturally acquired malaria and 15 cases of malaria in which infection had been induced both by blood inoculations and mosquito transmission. After the 5th or 6th attack of fever, in patients who presented no abnormality in hepatic functional reactions before infection, there was a progressive rise in the thymol reaction figure

(MacLagan's reaction); a strongly positive Hanger's cephalin-cholesterol reaction; total cholesterol was always reduced but proportionally much less than the esterified cholesterol of which, in certain cases, there were but traces; a fall in serum albumin, variable in amount, with a tendency of serum globulin to increase. These indications of hepatic functional derangement increase until therapy arrests the malaria, after which there is a rapid return to normal.

The fact that the reactions are exactly similar in both trophozoite- and sporozoite-induced malaria indicates that exo-erythrocytic forms of *P. vivax* in the liver are not responsible for the changes. They result from the strain imposed on the liver by repeated febrile attacks. Puncture of the liver in these cases shows a granular appearance of the cytoplasm of the liver cells which are increased in size; the intertrabecular spaces are also enlarged.

Norman White

WESTPHAL, A. Betrachtungen und neue experimentelle Untersuchungen zur Spezifität der Henry-Reaktion. [**A Consideration of the Henry Reaction and New Experimental Investigations.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, July, v. 2, No. 1, 68–75. [15 refs.]

The English summary appended to the paper is as follows :—

" Contrary to the findings of Kritschewski and Rubinstein (1935) that melanin from bovine eyes is a hapten prone to become a full-value antigen by the action of hog serum, experiments prove that hog serum alone is able to produce a positive Henry test in rabbits. They corroborate practical experiences made in many human diseases that the Henry test is unspecific with regard to the antigen. Healthy cats always give a weakly positive reaction, dogs always react strongly; hence the outcome of the test depends on the host. These findings, in conjunction with the proven influence of concomitant salts, indicate that the test is not a specific antigen-antibody reaction but simply an expression of instability. Since the reaction does not take place in a physiological medium it cannot be akin to a true immunity process. It is caused by constitutional factors, vegetative and nervous, of the diseased organism and should not be valued beyond this scope. The above findings and conclusions are opposed in some respect to the opinion expressed by Hormann (1948)."

JONES, B. S. **Congenital Malaria. Report of Three Cases.** *Brit. Med. J.* 1950, Aug. 19, 439–41. [12 refs.]

The author encountered 3 cases of congenital malaria due to *Plasmodium falciparum* in a series of 37 deliveries occurring in Lagos, Nigeria, between January 1 and June 30, 1949, the mother in each case being European. Two of the mothers had been long resident in the tropics, and had previously suffered from malaria, though neither had experienced a recent overt attack. The third, a more recent arrival, had had a clinical attack of malaria 3 weeks before delivery. Parasites of *P. falciparum* were found in the peripheral blood of the first infant on the second day of life, and in the cord blood in the other 2 instances. All three infants died within 4 days of birth.

The author observes that since only one of the three mothers admitted to any recent malarial attack, congenital transmission is evidently possible in the absence of active malaria in the mother during pregnancy. Moreover, in all 3 cases the placenta was macroscopically healthy and intact, a finding which does not support the view sometimes expressed that congenital malaria can only occur through mechanical damage to the placenta.

A fourth case, with recovery, in which the cord blood was found infected at birth occurred in the same hospital among 23 deliveries in the following July and August, so that in all there were 4 cases out of 54. The author concludes that among indigenous European women of relatively low immunity, infected with the Lagos strain of *P. falciparum*, congenital malaria is by no means rare : and stresses the importance of examining the cord blood for malaria parasites as a routine procedure in all cases where the mother is, or has recently been, resident in West Africa. *Gordon Covell*

Ortiz Machado, O. & Beyra Alemany, M. El paludismo en la infancia. [**Malaria in Infancy.**] *Rev. Méd. Yucatán.* 1949, Dec. 31, v. 25, No. 8, 145–51.

Cooper, W. C., Coatney, G. R. & Imboden, C. A., Jr. **Studies in Human Malaria. XXIII. Acquired Resistance to Chlorguanide in the Chesson Strain of *Plasmodium vivax*.** *J. National Malaria Soc.* 1950, Mar., v. 9, No. 1, 59–66, 3 figs. [12 refs.]

The study reported was carried out on white male volunteer prisoners in Seagoville, Texas. The Chesson strain of *P. vivax* is very sensitive to small doses of chlorguanide (proguanil). In eight primary attacks of sporozoite-induced malaria of this strain 1·5 mgm. of a salt a day produced temporary clearance of parasitaemia and fever, but relapses occurred while this dose was being continued.

Six volunteers were each inoculated intravenously with 500,000 erythrocytic parasites from a donor who had never taken chlorguanide. Treatment was begun on the 3rd day of patent parasitaemia. It was found that approximately 12·5 mgm. of chlorguanide hydrochloride a day for 7 days are required to eradicate these forms of Chesson strain *P. vivax*.

By progressively increased sub-curative courses of treatment of blood-induced infections, with serial subinoculations, a substrain of Chesson *P. vivax* was developed which resisted treatment with 1,600 mgm. of chlorguanide salt daily for 7 days, more than 1,000 times the dose that will produce temporary alleviation of the symptoms in infections with the parent strain. A similar technique did not produce resistance to chloroquine, to which drug chlorguanide-resistant strains responded normally. Studies in sporozoite-induced infections also produced evidence of developing drug-resistance to chlorguanide which could be explained by action upon erythrocytic parasites alone.

Norman White

Butts, D. C. A. **Results on 449 Cases of Naturally Acquired Malaria treated with Chloroquine.** *J. National Malaria Soc.* 1950, Mar., v. 9, No. 1, 44–9.

The object of this inquiry was to determine the optimal dosage of chloroquine for the treatment of *P. falciparum* and *P. vivax* malaria in a highly immune adult native population. Three hospitals belonging to the United Fruit Company were selected for the inquiry, in Panama, Costa Rica and Honduras, respectively. Uniform record cards were used : temperatures of patients were taken every four hours until normal temperatures were sustained for 24 hours, and blood smears were taken every twelve hours until no parasites were found in thick smears. The 449 cases included in this report are all those about which complete pertinent data were supplied. Of these 247 were *P. falciparum* and 202 *P. vivax* infections.

Sixteen dose schedules were tried, the total dose of chloroquine varying from 2·5 to 0·125 gm. In 57 *P. falciparum* and 54 *P. vivax* cases the administration of 0·6 gm., followed eight hours later by a similar dose, was effective. With

very few exceptions pyrexia and parasitaemia disappeared in 12 to 48 hours from the beginning of treatment. In only 15 of the 449 patients treated was there any sign of drug intolerance, and this only slight : such intolerance was never seen when the amount of chloroquine given was less than 1·2 gm. Young children tolerated the drug well.

For suppression 0·25 gm. of chloroquine once a week was effective.

Norman White

DEANE, L. M. & SUTTER, V. A. Novas observações feitas na Amazônia sôbre o tratamento da maláría com uma dose única de Camoquin. [**The Treatment of Malaria with a Single Dose of Camoquin in the Amazon Region of Brazil.**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1948, Dec., v. 2, No. 2, 515–26. English summary.

This is the record of the treatment of 522 attacks of malaria in 496 patients, in nine places in the State of Pará, Brazil. Each patient received a single dose of camoquin, in tablet form, the adult dose being 0·5 gm. ; the dose for children varied from 0·1 to 0·4 gm. according to age. Blood smears were examined before the drug was given and again seven days later. The blood of 121 patients was examined daily until free from parasites for three consecutive days. There were 246 *P. vivax*, 232 *P. falciparum*, 7 *P. malariae* and 37 mixed *P. vivax* and *P. falciparum* infections.

All patients were afebrile on the 4th day after the single dose. Except for *P. falciparum* gametocytes the blood of all patients was free from parasites seven days after treatment. Among the patients examined daily all were free from parasitaemia on or before the 4th day except for *P. falciparum* gametocytes. Second attacks of malaria were observed in only 15 of 121 patients who were under observation for ten months. The interval between attacks varied from 34 to 155 days. All second attacks were due to *P. vivax* except one *P. falciparum* infection. There were no symptoms of drug intolerance of any consequence.

Camoquin is well suited to the mass treatment of malaria.

Norman White

PISCAGLIA, A. Osservazioni cliniche sull'efficacia di un nuovo preparato antimalarico. [**Clinical Observations on the Efficacy of a New Malarial Remedy.**] *Acta Med. Italica.* 1950, Jan., v. 5, No. 1, 11–12. English summary.

During the war years when quinine was obtainable only with much difficulty in Italy, several substances were tried as a substitute in the treatment of malaria. The author reports the treatment of 45 cases of malaria, including both primary attacks and relapses, with a preparation of an unorthodox kind. R.A.R. is a proprietary preparation which has as its chief ingredients a concentrated solution of nitrates, chiefly potassium nitrate, with a trace of silicate and of salicylic acid, and acid fruit juice. The draught of 100 cc. is administered in two doses, at an interval of 24 hours. The prompt disappearance of all clinical symptoms, that followed this treatment, and the absence of further relapses, characterized all the cases reported. *Norman White*

ROBIN, C. & SERRE, E. Étude de chimioprophylaxie du paludisme à Dakar et à Thiès à l'aide des nouveaux antimalariques de synthèse. [**Malaria Prophylaxis at Dakar and at Thiès with the New Synthetic Antimalarial Drugs.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1949, v. 6, No. 1, 13–19.

These observations were carried out in two selected areas, one in Dakar the other in Thiès. Children from 3 to 15 years of age were given prophylactic

treatment against malaria, one to three tablets, according to age, of either nivaquine B [chloroquine], paludrine or premaline N, once a week throughout the season of most active transmission. Malaria endemicity was low in both areas and the observations recorded do not allow any very definite conclusions to be drawn. The three drugs appear to have had approximately equal suppressive value. All were well tolerated. In Thiès about 78 per cent. of infections were due to *P. falciparum*, the remainder to *P. malariae*.

Norman White

WALLACE, R. B. **Mass Suppression with Chloroquine: Chloroquine and Pentaquine, and Neo-Premaline.** *Med. J. Malaya.* 1950, Mar., v. 4, No. 3, 190–204, 5 charts.

This work, carried out on a rubber estate in Malaya during 1949, was a continuation of the trials begun in 1948 previously recorded [this *Bulletin*, 1949, v. 46, 1116]. Full details concerning the terrain and the nature of the experiment were given in the previous publication.

In 1949 the malaria rate in the area approached the rates which were customary in pre-war years, for the first time since the reoccupation of the country. The Indian population which was chosen for the experiment contains the survivors of the Japanese occupation; many had been in Siam and almost all had suffered from malaria. Treatment had been entirely lacking or very inadequate, with the result that the survivors had developed a high degree of immunity by the end of the war. These facts probably explain the low incidence of malaria in post-war years in spite of high prevalence of *A. maculatus*. No anti-larval measures have been carried out since 1941.

Neo-premaline completely suppressed malaria in one group, the control group showing a high incidence. In other groups chloroquine, or chloroquine and pentaquine combined, given once a week, promptly brought to an end primary waves of malaria which were rising rapidly. *Norman White*

LINTS, H. A., COATNEY, G. R., COOPER, W. C., CULWELL, W. B., WHITE, W. C. & EYLES, D. E. **Studies in Human Malaria. XXII. Prolonged Suppression of Chesson Strain *Vivax* Malaria by the Weekly Administration of Chlorguanide or Chloroquine.** *J. National Malaria Soc.* 1950, Mar., v. 9, No. 1, 50–58, 1 fig. [20 refs.]

Prison volunteers in Seagoville, Texas, were subjected to this inquiry, which was designed to ascertain whether weekly doses of chloroquine or of chlorguanide (proguanil) would suppress sporozoite-induced *P. vivax* malaria (Chesson strain); if so, would the infections survive six or twelve months of drug administration; if malaria appeared after the period of suppression, would the number and spacing of attacks differ from those in individuals who had received no suppressive drug?

Chloroquine diphosphate in tablet form containing 0·3 gm. base, and chlorguanide in capsule containing 0·15 gm. base, were used. *Anopheles quadrimaculatus* transmitted the infections, each volunteer being bitten by ten infected mosquitoes. Twenty-seven white male volunteers were thus infected. Nine of them were given a tablet of chloroquine (0·3 gm. base) once a week, the first tablet being given 3 days (4 subjects) or 7 days (5 subjects) before infection. Nine others received chlorguanide, 0·3 gm. base, once a week, the administration being exactly similar to that of chloroquine. Nine volunteers received no protective medication.

No patent parasitaemia occurred in any subject receiving suppressive medication, but 3 men taking chloroquine had oral temperatures above 100°F.

on the 10th or 11th day after infection. Acute attacks of malaria occurred in all subjects after the termination of suppressive medication, regardless of whether this had been continued for 6 or 12 months. Except for delayed onset the pattern of attack following chloroquine suppression did not differ significantly from that following chlorguanide suppression. Somewhat fewer attacks of malaria occurred in the protected subjects than in the untreated controls. The total time from inoculation to final acute attack of malaria was only slightly prolonged by the period of suppression. *Norman White*

COATNEY, G. R., COOPER, W. C., WHITE, W. C., LINTS, H. A., CULWELL, W. B. & EYLES, D. **Studies in Human Malaria. XXIV. Protective and Therapeutic Trials of SN 10,751 (Camoquin) against the Chesson Strain of** *Plasmodium vivax*. *J. National Malaria Soc.* 1950, Mar., v. 9, No. 1, 67–74, 3 figs. [10 refs.]

The experiments designed to assess the value of Camoquin (CAM-AQ1) as an antimalarial drug were carried out on white male volunteer prisoners in Seagoville, Texas. Each was infected with the Chesson strain of *P. vivax* by the bites of *A. quadrimaculatus*. Whenever possible the subjects were kept under observation for 18 months, blood smears being taken at least twice weekly. Camoquin was given as the dihydrochloride dihydrate, 76·6 per cent. base, in tablets containing 50 mgm. of base. Other patients in the same experiment were treated with chloroquine.

Five men were given 0·6 gm. camoquin the day before the infecting bites and on each of the succeeding 7 days : they did not develop patent malaria until 53 to 102 days (mean 69 days) after the last dose of drug. Five men were given 0·3 gm. once a week beginning 6 to 4 days before bites and continued for 6 doses after bites : none developed malaria during the period of drug administration but attacks developed 28 to 41 days (mean 34·2 days) after the last dose. Four untreated controls developed acute malaria 11 to 13 days after the infecting bites.

Malaria developing in the above 14 subjects was treated either with camoquin or chloroquine. The dosage for both drugs was 0·1 gm. every six hours on the first day followed by 0·05 gm. every six hours for 13 days, 3·0 gm. in all. Only the first 3 attacks in each subject are considered ; acquired immunity is a factor complicating later attacks.

Camoquin cleared parasitaemia slightly less promptly than chloroquine, mean clearance time being 3·2 as compared with 2·5 days. Clinical response as determined by the disappearance of fever was almost the same in the two groups. The mean interval from treatment to relapse in 18 attacks treated with camoquin was $67 \pm 5{\cdot}06$ days. The corresponding mean for 18 attacks treated with chloroquine was $83{\cdot}7 \pm 11{\cdot}4$ days. Camoquin was well tolerated. It compared favourably with chloroquine. It displayed activity only against erythrocytic parasites. *Norman White*

MUDROW-REICHENOW, Lilly. Ergebnisse und Probleme der Malariaforschung. [**Results and Problems of Malaria Research.**] *Riv. di Malariologia.* 1950. June, v. 29, No. 3, 133–48. [34 refs.]

BRUMPT, L. C. Quelques remarques à propos de la lutte antipaludique en Corse. [**Notes on the Anti-Malarial Campaign in Corsica.**] *Bull. Acad. Nat. Méd.* 1950, v. 134, Nos. 21/22, 427–30, 2 figs.

Hall, T. F. & Hess, A. D. **Plant Control Studies in Tennessee Valley Reservoirs.** *J. National Malaria Soc.* 1950, June, v. 9, No. 2, 153–72, 2 figs.

The authors describe a continuation of experiments begun in 1945 on the control of plants in TVA reservoirs by spraying with synthetic plant hormones (2,4-dichlorophenoxyacetic acid and its derivatives [this *Bulletin*, 1947, v. 44, 1042]).

For effective control almost complete coverage of the plant is essential : provided this is obtained with the same 2,4-D acid equivalent the volume of spray used is unimportant and may be obtained in dilute solution at 125 gallons/acre or in high concentration at the rate of 1 quart/acre ; with higher concentrations particle size must be correspondingly reduced. High-volume coarse sprays are preferred near sensitive crop plants in order to minimize the danger from drift : and aeroplane spraying should be confined to the off-season for cotton or to areas away from sensitive crops.

For practical purposes all formulations tested possessed equal potency except with lotus (*Nelumbo pentapetula*) where esters appeared to be more effective than salts. The use of a salt of 2,4-D is recommended against black willow (*Salix nigra*), trumpet vine (*Campsis radicans*), cocklebur (*Xanthium americanum*) and weak rush as being more economical than esters and relatively fumeless.

The minimum lethal dose for most susceptible species varies between 1–3 lb. acid equivalent/acre : but with lotus it is about 1½ oz./acre. Maximum susceptibility for most species occurred after full summer foliage until the fall ; cattail (*Typha latifolia*), however, was most susceptible during spring growth. Water is as good a vehicle as kerosene.

General observations suggest that mixtures of 2,4-D and 2,4,5-T possess synergic action with many woody plants, although not with lotus and buttonball (*Cephalanthus occidentalis*). Tables of susceptibility of woody and herbaceous species are given. Formative effects and the inhibition of seed production by sublethal doses are discussed.

Ammonium trichloracetate gave 100 per cent. control of panic grass (*Panicum agrostoides*) for at least 2 years, after one application of 100 lb./acre but the same formulation was ineffective against buttonball. Ammonium sulphamate applied to black willow as a foliage spray at 50 lb./acre gave moderate control for 1 year. *C. G. Johnson*

Le Gouas, J. Mise en place d'un dispositif antipaludique dans la presqu'île de Dakar. [**Method of Working Antimalaria Control Measures in the Dakar Peninsula.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1949, v. 6, No. 1, 93–7, 1 coloured graph & 1 coloured folding map.

Since 1946 there has been a very noteworthy regression of malaria incidence in Dakar. To illustrate this, figures are given of the incidence of malaria in naval and military establishments in the three years 1946–48. The most striking instance is that of the Bel-Air Aero-Naval Base. In 1946 locally acquired malaria infections numbered 94 among a population of 450 : in 1948 there were only 5 cases though the strength of the establishment had increased to 580.

A special antimalaria service was created in 1947 and an account is given of its activities. A very large amount of antilarval work has been carried out. In the neighbourhood of Dakar are innumerable depressions that are subject to flooding (*marigots*) ; these are prolific sources of mosquito breeding (*A. gambiae*). These are treated with a larvicide but as an additional precaution all houses, sheds and stables between these breeding grounds and the town

are sprayed with DDT four times a year. Mosquito nets are less and less used in Dakar; fewer antimalarial drugs are consumed; locally acquired malaria decreases in this area (which is a peninsula). *Norman White*

VISWANATHAN, D. K. & RAMACHANDRA RAO, T. **Control of Rural Malaria with D.D.T. Indoor Residual Spraying in Kanara and Dharwar Districts, Bombay Province: Second Year's Results, 1947–48.** *Indian J. Malariology.* 1948, Sept., v. 2, No. 3, 157–210, 7 charts.

The initiation and early progress of this work has been previously described (this *Bulletin*, 1949, v. 46, 16). In the year under review there was some extension of area and minor changes in staff allocation, but essentially the scheme remained unchanged. The promising results previously obtained were continued and improved upon. They are fully tabulated and illustrated, and are summarized below. In comparing results in sprayed and unsprayed areas it is to be borne in mind that the former were originally selected as being more malarious than the latter, that *A. culicifacies* is the vector in Dharwar District, and *A. fluviatilis* in Kanara District, and that work in Belgaum and Khanapur was started in the year reviewed.

	Sprayed Villages	Unsprayed Villages
A. fluviatilis catch in houses in 2,000 man-hour search	3	350
A. culicifacies catch in houses and cattlesheds, per 10 man-hour search	3	50
Spleen Rates:		
Kanara	11·6%	47·1%
Dharwar	10·6%	25·1%
Belgaum and Khanapur	19·4%	33·5%
Parasite Rates:		
Kanara	2·7%	19·5%
Dharwar	0·9%	5·2%
Belgaum and Khanapur	2·9%	13·6%
Infant Parasite Rate:		
Kanara	0·4%	20·0%

Deaths and morbidity are recorded by Districts and Dispensaries, not by sprayed and unsprayed villages, but a satisfactory decrease appears to have taken place in both.

The authors state that although *A. fluviatilis* appears from figures such as the above to have been reduced almost to vanishing point, there is little possibility of eradication being achieved as larger numbers survive in cattle sheds. Eradication of *A. culicifacies* is quite out of the question. There is, however, no evidence that either of these two have been repelled and live to bite elsewhere.

[This is one of the best available documented accounts of the progress of a large malaria control scheme of this nature, and consultation of the original is recommended.] *G. Macdonald*

VISWANATHAN, D. K. **A Study of the Effects of Malaria and of Malaria Control Measures on Population and Vital Statistics in Kanara and Dharwar Districts as compared with the Rest of the Province of Bombay.** *Indian J. Malariology.* 1949, Mar., v. 3, No. 1, 69–107, 8 graphs. [10 refs.]

The author has studied the population statistics since 1881 and the vital statistics since 1936 in Bombay Province, and particularly in Kanara and

Dharwar Districts where extensive malaria control measures are now in progress [above]. In the studies of population he has recorded the actual change and expressed the general trend, whether increase or decrease, as regression coefficients, which show the proportionate change occurring in the average year. The trends in vital statistics are similarly studied, but the regression coefficient is calculated only on data for the years before DDT work was started. The trend recorded in this way is extrapolated into the DDT years, to provide an "expected" standard of statistics, and the actuals are compared with these. In some cases the confidence interval of the fitted regression line is also calculated, giving the extremes of variation to be expected from random errors.

The weakness of the figures lies in the original collection of data, which may not include more than 85 to 90 per cent. of happenings. The author appreciates this, and the possibility that control work might have stimulated improved registration, but concludes that the proportionate error is not markedly changed.

The full mathematical analysis can only be followed in the original. The author concludes that in hyperendemic areas the population shows a steady decline, and an increase in less malarious areas which is not comparable with that in the Province as a whole. Some of the more important vital statistics are tabulated below, but in this summarizing statement figures for 1948 only are given.

	Kanara		Dharwar		Province	
	Expected	Observed	Expected	Observed	Expected	Observed
Death rate ...	21·37	16·26	32·86	19·61	25·02	21·62
Infant mortality rate	142·0	109	161	118	159	146
Malaria death rate	1·98	0·80	4·09	0·85	1·65	1·51
Diarrhoea and dysentery death rate	1·01	0·75	0·77	0·57	0·72	0·81
Birth rate ...	28·41	34·69	30·87	38·38	31·03	32·74

The author reaches very conservative conclusions on his data and does not think that they show any material effect of malaria on general mortality, though there is a material effect on the birth rate and morbidity, and on the malaria death rate. [The reviewer does not agree. The figures given above, read with the tables of significance on p. 89 of the original, seem to show a real decrease in mortality following malaria control.]

The implications of the changes following malaria control are fully discussed. In the past, population changes have led to a deteriorating management of land which can now be improved, as it is expected that there will be a progressive increase in available man power. *G. Macdonald*

Viswanathan, D. K., Ramachandra Rao, T. & Juneja, M. R. **A Preliminary Note on the Use of Benzene Hexachloride as a Residual Insecticide compared with Dichloro-Diphenyl-Trichlorethane.** *Indian J. Malariology*. 1949, Mar., v. 3, No. 1, 57–67.

The effectiveness of gamma benzene hexachloride (BHC) and DDT against anopheline mosquitoes was compared in field trials in Bombay Province. The

area was divided into three approximately equal parts ; one was sprayed twice with BHC applied as a wettable powder at the rate of 11 mgm./sq. ft., another twice with DDT at the rate of 56 mgm./sq. ft. and the third acted as a control. The spraying was carried out some weeks after transmission had begun.

The reappearance of anophelines was considerable within two weeks after the first spraying with DDT or BHC, but after the second spraying DDT was effective up to 8 weeks and BHC up to 4 weeks. The reduction in the childhood parasite rates. and infant parasite rates, after spraying with DDT or BHC, is given in the following table :—

	Unsprayed villages		BHC villages		DDT villages	
	Sept. (when transmission has just started)	Jan. (end of transmission season)	Sept. (before spraying)	Jan.	Sept. (before spraying)	Jan.
Childhood parasite rates per cent.	15	29·9	5·7	17·3	6·7	12·9
Infant parasite rates per cent.	7·4	50	2·4	9·5	0	4

[In view of the fact that parasite rates in the sprayed villages were lower than in the control villages before spraying was started, it is not easy to see how comparable differences after spraying could be attributed to the sprays.]

C. M. Harrison

NAIR, C. P. **Investigations on D.D.T. Barrier Spray in *A. letifer* Areas.** *Indian J. Malariology.* 1949, Mar., v. 3, No. 1, 119–27.

DDT solutions in kerosene (5 per cent. and 2·5 per cent.) were applied at a dose of 5 gallons per acre to the ground and vegetation in a belt 50 yards wide around selected groups of houses in Selangor District, Malaya. Four previous mosquito collections had been made from each and subsequent ones were made on alternate nights. Untreated groups of houses and groups treated with kerosene alone were also used as controls. *Anopheles letifer* was the predominant malaria vector. There was an immediate disappearance of mosquitoes after treatment of all areas, but in the kerosene control groups the populations were re-established in 12 hours. In the area treated with 5 per cent. DDT mosquitoes reappeared on the average in 9 days, anophelines in 12 days, and mosquitoes reached 10 per cent of their previous number in 11 days. In the areas treated with 2·5 per cent. DDT the corresponding figures were 5, 13, and 7 days. The addition of ground-nut oil to 2·5 per cent. solutions did not appear to make any material difference.

G. Macdonald

PINOTTI, M. Combate à malária no Brasil. [**Antimalaria Campaign in Brazil.**] *Folha Med.* 1950, Mar. 25, v. 31, No. 6, 41–3.

This is an enthusiastic article concerning the achievements and prospects of the National Malaria Service of Brazil ; it is a proud record. A brief summary is given of the widespread malaria endemicity of the huge country. Of recent years there has been a reorientation of malaria control work. Today

chief reliance is being placed on residual spraying of buildings with DDT, the widespread use of chloroquine, and more and more epidemiological inquiries to direct and control these activities. There has been an accompanying decrease in sanitary engineering work. In the south of the country work on the destruction of bromeliads continues.

This year some three million premises, sheltering from 15 to 20 million individuals, will have been sprayed. For treatment a single dose of chloroquine has been found sufficient for clinical cure : practically everyone in the country is able to obtain this drug within a maximum distance of six kilometres from his home, without any payment. These measures have already proved their worth : illustrative instances are quoted. In Guia de Pacobaiba (State of Rio de Janeiro) in 1947 before spraying, parasites were found in the blood of 20 of 100 infants examined : none was found infected in either of the two following years though larger numbers of infants were examined. This is a typical example of many. In the city of Bom Jesus de Lapa on the San Francisco River 372 anophelines were captured in 258 houses inspected in 1946, before spraying : in 1948 only 5 were found in 372 houses, and none in 300 houses in 1949.

In 1949 the Institute of Malariology was officially opened. The equipment of this leaves nothing to be desired. Its Entomological, Protozoological, Insecticide and Therapeutic Sections will be devoted to research and the training of all grades of technical personnel.

For the destruction of bromeliads, which provide breeding facilities for anopheles of the *Kerteszia* group, in southern Brazil, experiments have been carried out on a large scale by spraying with sulphate of copper 1 per cent. solution. Sulphate of copper in powder form has also been used. The results have been promising.

Brazil's large-scale anti-malaria efforts, carried out with much enthusiasm, have already given results which embolden the author to contemplate the eventual eradication of malaria from his country. *Norman White*

PINOTTI, M. O problema da malária no Brasil. Esforços empreendidos para sua solução. [**The Problem of Malaria in Brazil ; Measures envisaged for its Solution.**] *Folha Med.* 1950, Feb. 25, v. 31, No. 4, 27–31.

This article covers much the same ground as the author's later publication summarized above.

PINOTTI, M. Orientação atual da luta contra a malária. [**Present Position of the Campaign against Malaria.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1949, Oct., v. 1, No. 4. Suppl., 345–64, 12 figs. on pls.

DEANE, L. M., LÉDO, J. F., FREIRE, E. P. S., COTRIM, J., SUTTER, V. A. & DE ANDRADE, G. C. Contrôle da malária na Amazônia pela aplicação domiciliar de DDT e sua avaliação pela determinação do índice de transmissão. [**Control of Malaria in the Amazon Region by DDT House Spraying and the Opportunity afforded thereby for determining the Index of Transmission.**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1948, Dec., v. 2, No. 2, 545–60, 1 map. [10 refs.] English summary.

In a previous publication an account was given of a large-scale campaign of malaria control by means of residual spraying with DDT of buildings in the Amazon region of Brazil [this *Bulletin*, 1949, v. 46, 331]. The present report deals with progress made during a year ending September 1948. In the last round of spraying, 45,033 buildings in 92 localities were treated : these housed

a population of about 220,000. Each crew dealt on the average with nine houses a day at an average cost of US $1·90 per building. The spraying was well received by the people. In addition to the large area of the Amazon region in which *A. darlingi* is the vector, a section of Belém was included in the programme where *A. aquasalis* also transmits malaria. In Manaus and Belém there were only two sprayings in the year : elsewhere there were three. The kerosene emulsion formerly used is being replaced by DDT emulsion.

As a measure of the efficacy of DDT spraying in malaria control an examination is made of infants under one year of age at the health centres in the region. In Porto Velho for example, which had been sprayed six times, only 5 infants out of 250 (618 blood examinations) were found infected, and these five had visited endemic areas. The blood examination of 63 infants born during the same period in the vicinity of Porto Velho which had not been treated revealed the presence of parasites in 38 (60 per cent.). *Norman White*

STAGE, H. H. & PRATT, H. O. **Observations on Mosquito and Malaria Control in the Caribbean Area. Part IV—Puerto Rico.** *Mosquito News.* 1950, June, v. 10, No. 2, 54–7.

It is evident that the island of Porto Rico possesses considerable physical attractions, but that malaria is or has been a serious problem. Three species of *Anopheles* (and 26 Culicines) are known to occur. *A. albimanus* is exceedingly abundant, indeed a bait trap may catch as many as 5,500 in one night as a maximum figure. The insect breeds in an immense variety of waters which differ from one another in size, salinity and the presence or absence of " non-vital flotage ". *Anopheles grabhamii* and *vestitipennis* also occur.

A number of attempts have been made to control the malaria by drainage, the use of different larvicides and house spraying. The conclusion appears to have been reached that the residual spraying of houses with DDT is likely to be most effective. [This conclusion is unexpected for *A. albimanus* is by no means exclusively a house haunter, or an insect that feeds on man, so that one would suppose that even the most efficient spraying of houses would only kill a small proportion of the mosquitoes.] The Department of Public Health of the island is now considering whether to undertake a campaign of eradication : as a preliminary they may carry out an experimental campaign on a smaller island about twenty by three miles, which lies some six miles from the coast of Porto Rico. *P. A. Buxton*

SCHNEIDER, J. & MONTÉZIN, G. Technique d'utilisation au laboratoire de la nouvelle souche de *Pl. berghei* pour l'étude et la recherche des médicaments antipaludiques. [**The Use of *P. berghei* for the Study of Antimalarial Drugs.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 3/4, 144–8, 4 figs.

In this paper the authors report improvements in the technique of testing drugs against *Plasmodium berghei* since the publication of their previous paper [this *Bulletin*, 1950, v. 47, 325]. Their aim was to standardize the behaviour of the parasite in mice, in order to (*a*) ensure the regular appearance of parasitaemia within 24 hours after inoculation and, (*b*) produce infections with a progressive increase of parasites and a fatal termination. The first object was attained by pooling the blood of several heavily infected mice (more than 10 per cent. infected red cells), adding to it an equal volume of 2 per cent. citrate and inoculating 0·1 cc. intraperitoneally into clean mice. Of 150 mice treated in this way, in 93 per cent. the parasites appeared in the blood within 24 hours. This method also satisfied the second object, for the number of parasites in

the infected animals rose steadily during the first five days, after which it remained practically stationary, while death ensued within the first five days in 42 per cent., in 5–10 days in 23 per cent., in 10–20 days in 15 per cent. The standardization of the course of infection in mice has facilitated the test of drugs under uniform conditions. *C. A. Hoare*

McGhee, R. B. & Trager, W. **The Cultivation of *Plasmodium lophurae in vitro* in Chicken Erythrocyte Suspensions and the Effects of some Constituents of the Culture Medium upon its Growth and Multiplication.** *J. Parasitology.* 1950, Apr., v. 36, No. 2, 123–7.

Since previous observations indicated that inhibition of parasitaemia by adult chick plasma was responsible for the relative resistance of these birds to infection with *Plasmodium lophurae*, the authors studied this question *in vitro*, by cultivating this parasite in chicken erythrocyte suspensions. For this purpose they employed Geiman's BGM medium [this *Bulletin*, 1947, v. 44, 1043, 1046], which was modified in different ways in order to determine the effect of other constituents, such as glutathione and bovine albumin. The media were distributed in 4·5 ml. amounts into 50 ml. Erlenmeyer flasks, to each of which were added 1·3 ml. normal blood from chicks of different ages and 0·2 ml. parasitized chick blood. The effect of the age of the host upon the survival of the parasites was determined by preparing cultures with erythrocytes, plasma, or its fractions, taken from birds of various ages.

The results of these experiments are shown in tables. From these it is seen that growth of the parasites is best in BGM medium in the presence of homologous plasma, while the substitution of chick plasma by albumin fraction of bovine plasma has an adverse effect upon them. The addition of glutathione reduced the number of degenerate parasites in culture, but the use of defibrinated instead of heparinized blood showed no advantage. As regards plasma from birds of different ages, in contrast to the *in vivo* effect of adult plasma and its fraction, the addition of these substances not only had no inhibitory effect on the parasites *in vitro*, but actually favoured their development.

C. A. Hoare

Garnham, P. C. C. **Exoerythrocytic Schizogony in Bat Malaria.** [Correspondence.] *Nature.* 1950, July 22, 155.

Malaria parasites have been described in the epauletted fruit bats of tropical Africa. A similar parasite has been recorded in *Epomophorus wahlbergi* in Kenya by Heisch, who collected a number of these bats for the author.

Gametocytes were found in the blood of 4 of 17 of these bats. In tissue sections of the most heavily infected exo-erythrocytic schizonts were found in the liver. These varied from 45 μ in diameter to 70 $\mu \times 55$ μ : they were spherical, deeply convoluted and their very dense cytoplasm was studded with nuclei. These immature parasites lay between parenchyma cells : their origin could not be determined.

After further growth, the parasite apparently divided into well-defined cytomeres with a wavy border of unknown origin : these were more numerous at the periphery where presumably final division occurs. The last stage was not found, though post-mature bodies were common : these consisted of foci of phagocytic cells, including giant cells surrounding and invading free merozoites ; the foci were readily visible as minute white opaque spots on the liver surface.

No schizonts were found in the heart and lung, but further examinations will be made.

The appearances differed completely from those described by MER and GOLDBLUM in the case of exoerythrocytic schizogony in malaria of insectivorous bats (*Nature*, 1947, Mar. 29, 444). The present author feels justified in assigning the parasite now described in African fruit bats to the genus *Hepatocystis*. The main features resemble the developmental stages of *H. kochi* [this *Bulletin*, 1948, v. 45, 683, 839, 842]. *H. J. O'D. Burke-Gaffney*

LASTRA, Ivonne & COATNEY, G. R. **Transmission of *Haemoproteus columbae* by Blood Inoculation and Tissue Transplants.** *J. National Malaria Soc.* 1950, June, v. 9, No. 2, 151–2.

"*Haemoproteus columbae* infections in pigeons were transmitted in four of six trials by the transfer of 10 ml. of blood from donor birds which had been inoculated with sporozoites four days previously. Single trials at 8, 12, 14 and 26 days were unsuccessful. Transplants of lung tissue were infective when taken from 14-, 20- or 26-day old prepatent infections, but were negative at 8, 12 and 14 days. Transplants of spleen, liver, heart and brain from the above pigeons were not infective."

TRYPANOSOMIASIS

ACRES, J. S. **A Study of Sleeping Sickness in an Endemic Area of the Belgian Congo over a Period of Ten Years.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, July, v. 44, No. 1, 77–92. [11 refs.]

Sleeping sickness was controlled for ten years (1934–1943) solely by regular diagnostic examinations and medicinal treatment of new cases and relapses. The area was a small district in the Belgian Congo extending from 2° to 3° S. Latitude and about 30 miles broad, with its medical centre at Bolobo, a town of 4,500 people on the left bank of the River Congo about 200 miles above Léopoldville. Nearly all the 20,000 inhabitants of the 45 villages (and the towns of Bolobo and Yumbi) were examined at least once a year by gland palpation, gland puncture in suspicious cases, and lumbar puncture when the glands showed trypanosomes. Infected persons were treated with 12 weekly injections of tryparsamide (or tryponarsyl), a few patients also receiving other trypanocidal drugs. The work was done by one European doctor (as part of his general duties) with native assistants. During the whole period 1,868 new cases were found and 1,527 were followed up for two years; the annual incidence of new cases fell steadily from 1·55 per cent. in 1934 to 0·48 per cent. in 1943.

The disease was somewhat mild, about 20 per cent. of the patients not complaining of any symptoms; the state of the cerebrospinal fluid was judged by the cell-count only, 5 cells or less per cmm. being considered normal. The cases were grouped into three classes: those with 0–5 cells, 6–100 cells, and over 100 cells per cmm.; the relative proportions of these groups remained about the same during the ten years, the average being 25·95, 42·25, and 31·8 per cent. respectively. Treated patients were examined every six months for two years, and if the results of gland puncture and lumbar puncture were negative they were regarded as cured. The cures ranged from 77 to 92 per cent. in different years and the death-rate from sleeping sickness varied from 6 to 20 per cent.

The author concludes that the method of control used is the best for a tropical rain-forest area like Bolobo; the results would have been better if the neighbouring areas had also been similarly dealt with. The need for

confidence between patient and doctor is important and this is promoted by regular annual examinations ; such confidence is also required for the success of prophylactic measures, *e.g.*, the use of pentamidine. *J. F. Corson*

González Vicente, D. Distribución y clasificación de las moscas del género "Glossina", de la Zona sanitaria de San Carlos de Fernando Póo. **Distribution and Classification of *Glossina* in San Carlos, Fernando Po.** *Rev. Sanidad e Hig. Pública.* Madrid. 1948. Mar., v. 22, No. 3, 254–60, 7 figs. (4 on 2 pls.).

Glossina palpalis palpalis is the only tsetse fly recorded by the author from the San Carlos region of the island of Fernando Po. The fly belts are confined to the coastal strip not further than 6–8 miles inland and at altitudes below 2,500 ft. Flies are most numerous along the banks of the rivers, but are also encountered in the cocoa plantations and much less frequently in coffee plantations owing to the dense shade of the latter. Man and animals appear to be attacked indiscriminately but human cases of trypanosomiasis are seen in all parts of the district. *M. T. Gillies*

Ferreira, F. S. da C. Contribuição para o estudo do líquido cefalorraquidiano na tripanossomíase humana. **Contribution to the Study of the Cerebrospinal Fluid in Trypanosomiasis.** *Gaz. Méd. Portuguesa.* 1950, v. 3, No. 2, 397–407, 1 graph. [13 refs.] English summary.

The author examined the cerebrospinal fluid of natives of Portuguese Guinea suffering from sleeping sickness ; he measured the pressure with Claude's manometer, counted the cells with Nageotte's counting chamber, and used the Sicard and Cantaloube method and the Takata-Ara reaction (flocculation by mercuric chloride) for the estimation of protein. In a control examination of 144 apparently healthy Africans 140 had not more than 3 cells per cmm. and not more than 0·025 gm. of protein per 100 ml. while the other four had from 3·1 to 3·3 cells per cmm. ; these are normal figures for other parts of tropical Africa.

The pressure was raised in 73 per cent. of 108 cases of sleeping sickness ; an increased cell-count was associated with increased protein in 74 per cent. of 385 observations, the cells alone being increased in 22 per cent. and the protein alone in 4 per cent. Trypanosomes were found in 30 (5·2 per cent. of 597 patients and only in advanced cases. In 100 of 500 cases the diagnosis was made only by lumbar puncture, no trypanosomes being found in the lymphatic glands, the blood (thick films and triple centrifugation) and the sternal marrow. The Takata-Ara reaction was weakly positive (— to ———) in 103 of 135 healthy controls and negative in 31 ; in 208 sleeping sickness patients it was weakly positive in 153, strongly positive in 54 and negative in 1. The results are shown in tables. *J. F. Corson*

See also p. 1128, Toulant, **Manifestations oculaires des trypanosomiases humaines. Maladie du sommeil—Fièvre de Rhodésie—Maladie de Chagas.**

Town, B. W., Wills, E. D., Wilson, E. Joan & Wormall, A. **Studies on Suramin. 8. The Action of the Drug on Enzymes and some other Proteins. General Considerations.** *Biochem. J.* 1950, Aug., v. 47, No. 2, 149–58, 2 figs. [24 refs.]

Suramin combines firmly with body proteins, and inhibits a number of enzymes though it is not a general enzyme poison (see Town *et al.*, this *Bulletin*, 1949, v. 46, 914, 1127 ; Wilson and Wormall, *ibid.*, 1950, v. 47, 120).

The plasma proteins combine with about 70 to 90 per cent. of the suramin present in the blood after an injection, and the combination strongly protects those enzymes that are otherwise susceptible to inhibition by suramin ; this might seem to run counter to any theory of the mode of action of suramin against trypanosomes which postulates direct inactivation of enzymes in the trypanosome. It is however feasible that, after an injection, suramin may gradually be released from the drug-protein complexes in the plasma, and may then enter the trypanosome in amounts which would be slightly inhibitory over a long period. An inhibition of merely 25 or 30 per cent. for a long period might easily disorganize the metabolism of the trypanosome sufficiently to lead to its death. It is also feasible, though still highly speculative, that the suramin-protein complex itself may diffuse into the trypanosome cell, and likewise lead to inhibition of some of the trypanosome's essential enzymes.

E. M. Lourie

WILLS, E. D. & WORMALL, A. **Studies on Suramin. 9. The Action of the Drug on some Enzymes.** *Biochem. J.* 1950, Aug., v. 47, No. 2, 158–70, 9 figs. [32 refs.]

The primary object of this work was to find out whether suramin, in amounts comparable with those sufficient to destroy trypanosomes in the blood and tissues after an injection, has any inhibitory effect on enzymes likely to be present in the trypanosome cell.

The salient features of the present report have already been set forth in two preliminary communications [see TOWN, WILLS and WORMALL, this *Bulletin*, 1949, v. 46, 914, 1127].

E. M. Lourie

BROWNLEE, G., GOSS, M. D., GOODWIN, L. G., WOODBINE, M. & WALLS, L. P. **The Chemotherapeutic Action of Phenanthridine Compounds. Part I.** ***Trypanosoma congolense* and *Trypanosoma rhodesiense*.** *Brit. J. Pharmacol. & Chemotherapy.* 1950, June, v. 5, No. 2, 261–76. [28 refs.]

The activity of phenanthridinium compounds against trypanosome infections was first described by BROWNING *et al.* [this *Bulletin*, 1938, v. 35, 344] ; WALLS [*J. Chem. Soc.*, 1947, 67] showed that high activity in this series is exhibited by quaternary salts in which there is a primary amino- group in the 7- and a phenyl group in the 9-position, activity being much enhanced by the presence of a second primary amino- group, as in 2 : 7-diamino-9-phenyl-10-methylphenanthridinium bromide (" dimidium bromide ").

The present paper describes results of the examination of a comprehensive series of phenanthridinium salts. It was confirmed that high activity against trypanosome infections in mice is a property of 9-phenylphenanthridinium salts with two primary amino- groups, one of which must be located in the phenanthridine ring. When the position of the second amino- group is varied among 9-*p*-aminophenyl quaternary salts the order of activity against *T. congolense* is 6-amino>2—>7—>>3——8—. With a 9-*p*-nitrophenyl substituent the 6-amino- compound much excels the others.

The 2 : 7-diamino- compounds are the most effective of the series, the triamino substance 2 : 7-diamino-9-*p*-aminophenyl-10-methylphenanthridinium chloride being the best against both *T. congolense* and *T. rhodesiense* infections in mice. It is about 1·5 times as active as dimidium bromide against *T. congolense*, and about as active as pentamidine isethionate against *T. rhodesiense* though more toxic and with less prophylactic activity than pentamidine. It

seems that increase in the number of amino groups is associated with progressive increase in trypanocidal activity, up to the maximum exhibited by this triamino compound.

Replacement of the primary amino- groups by amidino-, acetamido-, ureido-, urethano- or nitro- groups greatly reduces activity, but if one primary amino- group is left, especially in the phenanthridine nucleus, considerable activity may remain. 7-alkoxy-9-*p*-aminophenylphenanthridinium salts are highly effective against *T. congolense*, and, surprisingly, the corresponding salts with a nitro- in place of the amino- group were also found to be highly active.

Conversion of the primary amino- groups of dimidium bromide into tertiary results in loss of activity, and this suggests that hydrogen-bonding between the drug and an enzyme may be important. There is some evidence that trypanocidal activity is to some extent dependent upon the oxidation-reduction properties of the quaternary salts, and for the authors' further attempts at establishing structure-action relationships in this group of compounds the reader should refer to the original paper.

The compounds also have considerable antibacterial action, mostly apparent *in vitro* rather than *in vivo*, but this is not clearly related to their trypanocidal activity. *E. M. Lourie*

Goodwin, L. G., Goss, M. D., Lock, J. A. & Walls, L. P. **The Chemotherapeutic Action of Phenanthridine Compounds. Part II.** *Trypanosoma cruzi*. *Brit. J. Pharmacol. & Chemotherapy*. 1950, June, v. 5, No. 2, 277–86. [19 refs.]

Browning, Calver, Leckie & Walls [this *Bulletin*, 1946, v. 43, 633] showed that urethane-substituted quaternary phenanthridinium salts are active against *T. cruzi* infections in mice. The present authors report results of examination of a large series of phenanthridinium compounds in such infections.

When the compounds were administered during the incubation period of the disease it was found that activity was associated with one or other of the following structural features : (*a*) a 9-phenyl substituent, (*b*) a urethane group, and (*c*) two amino- groups. Most of the active compounds in fact combined features (*a*) and (*b*). Of over 200 compounds examined, 18 showed marked suppressive action, and all but one of these were 9-phenylphenanthridinium salts ; 11 of them contained a urethane group and 5 others contained two amino- groups. Phenanthridine compounds other than quaternary salts were inactive. There was little relationship between activity against *T. cruzi* and *T. congolense*.

When the active compounds were tested against established infections the only two to show much activity were the 3 : 4′-diurethano- compound described by Browning *et al.* [*loc. cit.*] and the 2-amino-9-*p*-urethanophenyl compound (" 3C47 "). Since results with the bisurethanes analogous to the former of these two compounds are unpredictable, and since synthesis of the latter involves a large number of steps, it was thought advisable to continue exploring the group, and the most hopeful course seemed to lie in an examination of further 9-phenylphenanthridinium salts substituted with both urethano- and amino- substituents. The best result in this further series was given by the analogue of " 3C47 " in which the primary amino- group was in the 3— instead of the 2— position. This compound, " 74C48 ", was as active in established infections as " 3C47 ", but had the advantage of much lower toxicity.

E. M. Lourie

GOODWIN, L. G., GOSS, M. D. & LOCK, J. A. **The Chemotherapeutic Action of Phenanthridine Compounds. Part III. The Pharmacological Properties of 3-Amino-9-*p*-Carbethoxyaminophenyl-10-Methylphenanthridinium Salts.** *Brit. J. Pharmacol. & Chemotherapy.* 1950, June, v. 5, No. 2, 287–305, 8 figs.

The most promising of the phenanthridine compounds tested against *T. cruzi* infections in mice, as described in Part II of this series above] was 3 - amino - 9 - *p* - carbethoxyaminophenyl - 10 - methylphenanthridinium ethanesulphonate (" 74C48 "), which may be called " carbidium ethanesulphonate ". It usually prevents the death of infected mice, though it does not always eradicate the infection. Since the compound seems worthy of clinical trial in human infections, the authors have wisely examined its toxic and pharmacological properties in considerable detail. Methods are described for its quantitative determination in body fluids and tissues.

The intravenous LD50 is 10 mgm./kgm. for mice and apparently about the same for rabbits. Subcutaneously the LD50 for mice is 130 mgm./kgm., and intraperitoneally 40 mgm./kgm. An intravenous dose of 7·5 mgm./kgm. daily for at least 10 days is well tolerated both by mice and rabbits. The drug is concentrated in the liver and kidneys, and excreted principally in the bile, but there was no evidence of permanent damage to liver or kidneys after repeated injections although there is some rise in blood urea during treatment. The useful property of bright orange fluorescence in ultraviolet light showed the drug to be highly concentrated in the kidney tubules. Injections into the tissues are irritant, especially when concentrated solutions are used, and the subcutaneous injection of 0·1 per cent. (w/v) solutions in rabbits caused redness and oedema; the limiting necrosing concentration on intracutaneous injection in guineapigs was about 0·0001 per cent. There were, however, no thromboses or necrotic effects after intravenous injections of 7·5 mgm./kgm. in mice, repeated daily for 10 days.

In man an intramuscular injection of 2 ml. of 0·5 per cent. (w/v) resulted in swelling and tenderness, at their maximum the following day, the swelling then subsiding rapidly though the tenderness persisted for 2 or 3 weeks. An intravenous injection of 8 ml. of 0·5 per cent. caused a transient very slight fall of blood pressure and rise of pulse rate. There was a bitter taste during the injection and this remained for two or three hours, together with flushing and a feeling of warmth. Appetite and sleep were unaffected. The blood urea fell from about 35 to 26 mgm./ml. during one hour after the injection, rose to 51 mgm. two and a half hours later, and fell to 32 mgm. by the next morning. There was slight albuminuria the morning after the injection. No symptoms or signs of late toxicity developed during the following four months.

The authors also report a number of pharmacological observations on the blood pressure and respiration, kidney volume and renal blood flow, spleen volume, cardiac volume, intestinal movements in the living animal and in an isolated organ bath, effects on isolated perfused rabbit and frog hearts, on blood vessels of the isolated perfused hind-limb of the rat, and on the knee-jerk of the chloralosed cat. The drug produces a fall of blood pressure and depression of respiration. Although it is concentrated in the kidney tubules, there appeared to be no specific effect on the renal circulation. There was no action on the nervous system as far as could be shown by the knee-jerk reflex.

E. M. Lourie

MCCOUBREY, A. **Contributions to the Chemistry of *iso*Quinolines. Part II. The Synthesis of Chloroamino-phenyl*iso*quinolines in a Search for New Trypanocides.** *J. Chem. Soc.* 1950, July, 1833–6.

AFRICA. **British African Land Utilization Conference, Jos, Nigeria, November 7th–15th, 1949** [EASTWOOD, C. G., Chairman]. **Final Report.** 52 pp.

The Report contains no mention of terms of reference, and it seems from the Secretary of State's introduction that the Conference was intended to facilitate an exchange of views rather than to arrive at any definite conclusions. Despite this handicap or limitation it produced a clear statement of the needs of agricultural development in Africa. Briefly, advance on the basis of peasant holdings without capital is not possible, and more advanced methods of agriculture and irrigation must be employed. Although a few individual Africans may be able to do this on their own initiative the solution for the bulk must lie in some form of collective farm, originally managed by an external agency but progressively transferred to the land holders. Various schemes of this nature were reviewed, particularly as regards their ultimate success and their economic return, and it was concluded that the evidence on these subjects is inadequate and pilot schemes in different types of country ought to be started.

Sub-committees considered various aspects of the machinery involved. The administrative arrangements, the necessary education, legislation and such matters are briefly described by one committee, another considered the pattern of agriculture and livestock development, it considered them in relation to vegetation and rainfall types, making recommendations for each, stressing the necessity of pilot schemes to gain experience and making specific proposals for them in arid pastoral areas (N. Nigeria) ; semi-arid agricultural pastoral areas (Sukumaland, Tanganyika) ; savannah areas (Nigeria and Gold Coast) ; high forest areas (Calabar) ; and swamp and flood land (Nigeria and the Bangweulu Basin).

The trypanosomiasis and tsetse fly group considered the risks to animals and man in various types of schemes. It considered that in agricultural projects the use of large-scale mechanized clearing is sufficient to ensure the eradication of tsetse of the savannah group, but where riverine species exist special measures must be undertaken which might involve considerable expenditure. It is stated that the human population must and can be given adequate protection by chemotherapy during the period while clearing is taking place, but it would be unwise to introduce cattle, though under some conditions sheep and goats might be kept. Similar considerations would apply to re-settlement schemes which must be carried out in close conjunction with the tsetse service. On the subject of pastoral areas the Committee was less optimistic, and concluded that the reclamation of large tsetse-infested areas for herds owned by Africans and maintained on a primitive pastoral system of management, would be uneconomic. Antrycide cannot be relied on as a prophylactic until further investigations have been carried out. Forest areas which are necessary can be planned so as to make them incompatible with the presence of *Glossina morsitans*, provided free access is given for the free hunting of game and other purposes.

Water development was considered. The necessity for water conservation and hydrological surveys was agreed upon, but there was no generally acceptable view on the effects of complete clearance, grass cover or forest cover, and in the absence of agreement it was decided that complete clearance should be avoided and catchment areas maintained under forest. The committee stressed the need for a self-contained water development department in each territory, but refrained from making many detailed recommendations owing to the varying conditions encountered in different countries. *G. Macdonald*

Wygodzinsky, P. & Abalos, J. W. *Triatoma guasayana* Wygodzinsky y Abalos, 1949, con notas sobre especies vecinas (*Triatominae, Reduviidae, Hemiptera*). [*T. guasayana*, **with Notes on Related Species.**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1950, May, v. 3, No. 1, 53–73, 56 figs. [13 refs.] **English summary.**

FEVERS OF THE TYPHUS GROUP

Weyer, F. Beobachtungen bei intracölomaler Infektion von Läusen mit Rickettsien. [**The Intracoelomic Inoculation of Lice with Rickettsiae.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, July, v. 2, No. 1, 40–51, 5 figs.

Lice were easily and safely inoculated with *Rickettsia mooseri* and *R. prowazeki* by the coelomic route. The method was successful in 24 out of 26 attempts. The results obtained were similar to those observed after intrarectal inoculation by Weigl's method, in that multiplication took place in the stomach ; multiplication of the rickettsiae in the coelom sometimes occurred.

Ova deposited by the infected female lice were found in some cases to contain rickettsiae which did not interfere with the development of the eggs. Larvae of the first stage were found to be infected but in those of the later stages no evidence of infection could be detected.

The author does not claim that the method has any practical advantages over Weigl's technique, but he states that it throws light on the biological characters of the rickettsiae. [See also this *Bulletin*, 1949, v. 46, 627, 818 ; 1950, v. 47, 619.] *John W. D. Megaw*

Kryński, S. & Woyciechowska, S. Badania nad dzialaniem siarczanu miedzi na *Rick. prowazeki* w hodowli laboratoryjnej met. Weigla. [**Influence of $CuSO_4$ upon** *Ri. prowazeki*.] *Przeglad Epidemiol.* Warsaw. 1949, v. 3, Nos. 1/2, 94–102.

The English summary appended to the paper is as follows :—

" $CuSO_4$ is highly toxic to *Ri prowazeki* in a suspension of intestines of infected lice.

" In our investigations we first established the toxic dose for lice. Solutions of from 0,014%–0,02% of $CuSO_4$ were found to be destructive to lice. Concentrations of 0,002% of $CuSO_4$ which are non-toxic to lice always destroy all, or at least the major part of *Ri prowazeki*. Lower solutions of 0,0002% exert weaker action but within half hour they diminish virulence of the suspension. The solution of 0,00002% is untoxic to *Ri prowazeki*.

" *Ri pediculi* are unaffected by the action of $CuSO_5$ even if the solution be 0,002%."

Dana, R., Sebag, A., Cohen, J. & Borsoni, G. A propos de quelques cas de typhus exanthématique. Le traitement par la chloromycétine. [**Cases of Typhus Exanthematicus treated by Chloromycetin.**] *Bull. et. Mém. Soc. Méd. Hôpit. de Paris.* 1950, Nos. 21/22, 1073–6.

Four cases of louse-borne typhus are described in all of which the immediate response to treatment by chloromycetin was prompt and satisfactory.

One of the patients who was given 12·5 gm. of the drug in four days became seriously ill two days after the end of the course of treatment, when he was

attacked by diarrhoea for which he was treated by sulphaguanidine in unstated doses. Next day he became somnolent and was found to be uraemic. On the following day his condition was worse ; there was a tendency to collapse and the temperature rose to 38·9°C.

In view of similar symptoms observed by the authors in cases of typhoid fever treated by chloromycetin no further doses of the drug were given. After a course of treatment in which a million units of penicillin and 1·0 gm. streptomycin were given the patient rapidly recovered.

Another patient had a slight relapse, with a temperature of 38°C. for two days, about the 15th day of the illness, and " several days " after the end of the treatment. *John W. D. Megaw*

STARZYK, J. & WESTRYCH, F. Skutecznosc preparatu azotox w porownaniu z DDT przy zwalczaniu wszawicy. **Comparison of the Efficacy of "Azotox " and D.D.T. in the Control of Lice.** *Przeglad Epidemiol.* Warsaw. 1949, v. 3, Nos. 1 /2, 178–86, 4 charts. [12 refs.] English summary.

The authors have compared the Polish preparation Azotox with DDT in the control of lice. In their English summary they state that Azotox produced in Poland corresponds to DDT made in the United States. Survival of lice was studied at room and incubator temperatures in open and closed Petri dishes : altogether 15,000 lice were examined.

They conclude that Azotox is an effective agent against lice. The " 100 per cent. preparation " corresponds to the " 100 per cent. preparation " of DDT but 10 per cent. Azotox as marketed was found to be less effective than 10 per cent. DDT

DDT was more rapid in action and more persistent. At body temperature, lice began to die in 7 hours when Azotox was used and all were dead in 60 hours. In the case of DDT mortality was evident in 3 hours and was complete in 24. The authors state that " the difference is caused probably by the less accurate solution of the 100 per cent. Azotox in the substance used as a base for the solution ".

They do not recommend the use of either preparation during outbreaks of typhus when immediate destruction of lice is required : but both can be used successfully in the control of persons infected with lice.

H. J. O'D. Burke-Gaffney

VASCONCELOS, J. V., TRAVASSOS, J. & PEREIRA, H. G. Tifo murino no Rio de Janeiro. III. Cultivo e propriedades de amostras de " Rickettsia mooseri " isoladas de ratos naturalmente infectados. **Murine Typhus in Rio de Janeiro. The Cultivation of *R. mooseri* isolated from Naturally Infected Rats.** *Hospital.* Rio de Janeiro. 1950, Apr., v. 37, No. 4, 571–85. [17 refs.] English summary.

Full details are given of the exhaustive study of two strains of *Rickettsia mooseri* isolated from the brains of rats caught in Rio de Janeiro.

Yolk-sac cultures were made from spleen suspensions and tunica vaginalis scrapings of guineapigs infected with the strains. By the usual modern methods of investigation the strains were shown to be identical in their antigenic properties with the Wilmington strain of *R. mooseri*. From the 14th to the 20th yolk-sac passages the strains were found to show a gradual diminution in virulence without any change in their power to produce antigens. From this and other similar findings by previous observers the authors raise the question of obtaining strains suitable for use as living vaccines. *John W. D. Megaw*

PEREIRA, H. G. & TRAVASSOS, J. Tifo murino no Rio de Janeiro. IV. Diagnóstico retrospectivo de casos humanos. [**Murine Typhus in Rio de Janeiro. The Retrospective Diagnosis of Human Cases.**] *Hospital*. Rio de Janeiro. 1950. Apr., v. 37, No. 4, 657–68. [16 refs.] English summary.

The sera of 680 persons living in conditions likely to be associated with risk of murine-typhus infection were tested by the Castañeda slide-agglutination test with *Rickettsia mooseri*. Eighteen sera were positive at a titre of 1–2; one was positive at 1–4; and four were positive at 1–8 or 1–10.

Complement-fixation tests were carried out on the 23 positive sera; five reacted at a titre of 1–5, and one at 1–10.

The Giroud intradermal neutralization test was carried out on five sera, and four gave positive results: three of these had also given a positive reaction with the fixation test, and one was from a person who was believed to have suffered from murine typhus nine years previously.

Among 17 sera positive with the slide-agglutination test, seven gave positive serum reactions for syphilis: this proportion was significantly higher than was obtained in tests for syphilis among 472 persons who were negative with the slide test: 77 of these gave a syphilitic reaction. The authors propose to carry out a further study of this subject. *John W. D. Megaw*

AUDY, J. R. **A Visit to Jarak Island in the Malacca Straits.** Reprinted from *Malayan Nature J.* 1950. June, v. 5, No. 2, 38–46, 1 text fig. & 4 figs. on 3 pls.

The author gives an interesting general description of a visit to a small uninhabited island, Pulau Jarak, which lies in the middle of the Malacca Straits. The visit lasted ten days: its purpose was to study the conditions in which scrub typhus infection existed in an area with a very limited number of species of mammals and arthropods.

Six cases of scrub typhus were known to have occurred among a party of eight persons who had visited the island in 1932.

The island is a forest-clad rocky ridge, less than 1,000 yards in length, with steeply sloping sides rising to a maximum height of 508 feet.

Two other experts, Mr. J. L. Harrison, a zoologist, and Mr. J. Wyatt-Smith, a forest botanist, were members of the party which consisted of ten persons in all. Only a few species of trees occur. Rats are exceedingly numerous; all of them belong to a special subspecies, *Rattus rattus jarak*, which is found only on the island and is regarded by Mr. Harrison as intermediate in some characters between *R. r. diardi* and *R. r. jalorensis*. The rats showed no fear of human beings; at times 10 to 20 would feed in the tent in which the investigators were eating their evening meal; all of them were heavily infested with *Trombicula deliensis*, and with "worms".

Large land crabs were nearly as numerous as the rats. Apart from a few birds the vertebrate fauna of the island was completed by skinks, geckos and a harmless colubrine snake. The insect fauna and the flora of the island consisted of a relatively small number of species and it is suggested that all the existing species must have been introduced since the emergence of the island, perhaps 50,000 years ago.

The rat population consisted chiefly of adults; the unusually small number of young rats is attributed to a low rate of reproduction: no mention is made of cannibalism which might be expected to occur among rats whose numbers are not restricted by predators.

No cases of scrub typhus occurred as a result of the visit. The chief precautionary measure was impregnation of the clothing with dibutyl phthalate

but members of the party " would relax in the evening in negligible trunks or non-treated sarongs, with bare feet, on what we had good reason to believe was infected ground " but because of the numerous rats in the camp " most of the mites were doubtless able to find their favoured hosts before they became obliged to attack us ".

The paper is written in the author's usual racy style ; it contains observations which will interest zoologists, botanists and even geologists.

John W. D. Megaw

TRAUB, R., FRICK, L. P. & DIERCKS, F. H. **Observations on the Occurrence of *Rickettsia tsutsugamushi* in Rats and Mites in the Malayan Jungle.** *Amer. J. Hyg.* 1950, May, v. 51, No. 3, 269–73. [14 refs.]

The authors begin by discussing the evidence contained in the literature with a bearing on the problems of the occurrence of scrub typhus in areas of dense jungle, and the occurrence of vectors other than *Trombicula deliensis* and *T. akamushi*.

In the course of the present study the authors have recovered *Rickettsia tsutsugamushi* from the tissues of three species of rats, *Rattus mülleri*, *R. edwardsi*, and a species of the *R. rajah* group, all of which were caught in primary jungle near Kuala Lumpur. They have also recovered the organism from the trombiculid mite *Euschöngastia indica* collected from tree squirrels in the same area.

This is said to be the first time that natural infection has been reported in the above species of rats and in the mite *E. indica*.

The authors conclude that scrub typhus appears to be endemic in certain jungle areas and may involve a number of species of small mammals and mites.

John W. D. Megaw

FORBES, J. **Q Fever in North Wales.** *Lancet.* 1950, Aug. 12, 267–8.

Report of a case which responded to aureomycin. It was not possible to trace the mode of infection.

SIEGERT, R., SIMROCK, W. & STRÖDER, U. Über einen epidemischen Ausbruch von Q-Fieber in einem Krankenhaus. [**A Hospital Outbreak of Q Fever.**] *Ztschr. f. Tropenmed u. Parasit.* Stuttgart. 1950, July, v. 2, No. 1, 1–40, 10 figs. [Numerous refs.]

The authors describe in detail a remarkable outbreak of Q fever in which 38 cases occurred among the patients and staff of two wards of the University of Frankfort Medical Clinic in October and November, 1948.

The clinical and epidemiological aspects of the outbreak were thoroughly investigated. The origin of the outbreak was definitely traced to a laboratory assistant who was admitted to hospital and was found to be suffering from Q fever pneumonia ; his infection occurred while he was working with a strain of *Rickettsia burneti* isolated from a patient suffering from " Balkan grippe ". For about two months the laboratory assistant was highly infectious to persons with whom he came into contact ; during this period he remained febrile. For a further period of three months rickettsiae were constantly present in his sputum but no other cases of infection occurred among contacts. Most of the patients must have been infected by inhaling infected droplets or dust, but there were some cases in which infection " could be explained only by indirect contact or other carrying agents ". A study of the incidence of the attacks showed that first in one ward and then in another to which the patient was

transferred the transmission of infection was closely associated with the frequency and closeness of contact with the patient during the period for which he remained a carrier.

A consequence of the outbreak was the occurrence of seven cases of the disease among the staff of the Paul Ehrlich Institute of Frankfort, between the end of December, 1948, and the middle of February, 1949.

The authors state that this is the first time a hospital outbreak of Q fever could be definitely traced to a human carrier.

The paper contains a fully documented summary of the literature of the disease and a vivid description of the clinical and other features of the outbreak.

John W. D. Megaw

SIGEL, M. M., SCOTT, T. F. McN., HENLE, W. & JANTON, O. H. **Q Fever in a Wool and Hair Processing Plant.** *Amer. J. Pub. Health.* 1950, May, v. 40, No. 5, 524–32, 1 fig. [28 refs.]

An outbreak of Q fever occurred during the first three months of 1948 in a wool-processing factory in Philadelphia. During this period 30 persons suffered from fever of unknown origin.

In late July and early August samples of blood were taken from 152 of the 186 persons employed in the factory. There were 67 positive reactions with the complement-fixation test for Q fever, and 39 of these were at titres of 1–64 or over.

Among 37 persons classified as having been ill, 29 reacted at titres ranging from 1–8 to 1–2,048. Among 115 classified as not having been ill, there were 31 reactions at titres of 1–8 to 1–1,024, so that there must have been a number of cases among persons who were not obviously ill during the period.

In the processing of wool and goat hair much dust was produced and it seemed likely that the infection was by inhalation of infected dust in the factory. No secondary cases were known to have resulted from contact with the infected persons.

The place of origin of the infection could not be discovered ; the wool came from many countries of the world ; sometimes in the crude state and sometimes already scoured.

John W. D. Megaw

YELLOW FEVER

COURTNEY, K. O. **Report on the Recent Outbreak of Jungle Yellow Fever in Panama.** *Amer. J. Pub. Health.* 1950, Apr., v. 40, No. 4, 417–26, 5 maps.

Epidemic yellow fever disappeared from Panama in 1907. In 1943 some children, born since 1925, were found to give positive mouse protection tests, but no concern was felt till January, 1949, when a number of deaths in a village 18 miles from Panama City were attributed to yellow fever and confirmed by pathological examination. An *Aëdes aegypti* control programme had been established in the cities and throughout the Canal Zone in 1943, and a malaria control programme by the use of DDT in all malarious regions had been operating since 1947. On the confirmation of yellow fever deaths a special organization was immediately set up and built on these pre-existing schemes. It had as objectives the immunization of as many as practicable of the inhabitants of the Republic, and the eradication of *Aëdes aegypti* from it.

Immediate emergency vaccination was carried out in the groups most at risk and then extended to the whole country. Physical difficulties of travel often made constant refrigeration of vaccine impossible, so the Dakar vaccine

which does not need refrigeration, and is given by scarification, was used for the first time in the Americas, as well as the standard 17D vaccine. [WHO tests and approval of the Dakar vaccine were reviewed in this *Bulletin*, 1946, v. 43, 1135 ; 1947, v. 44, 73.] Despite major difficulties 500,000 out of the 600,000 population were vaccinated in 7½ months. Vaccination of the remainder was considered impracticable. The existing DDT work was augmented. 193 villages and towns were sprayed in six months—in the last 11 weeks of which only two positive foci were found.

Of 732 human blood specimens examined, 100 (13 per cent.) from widely distributed areas gave positive mouse protection tests. Of 100 monkeys 30 were positive, all apparently from a restricted area near the Canal Zone. No *Haemagogus capricorni* have been found in the forests ; two proven vectors, *H. spegazzinii falco* and *Aëdes leucocelaenus*, were recorded, though only after the onset of the rains, and are being studied to determine which is the local vector. *G. Macdonald*

DENGUE AND ALLIED FEVERS

PAVLOVSKY, E. N. [**Sandfly Fever and its Vector.**] 90 pp., 35 figs. [31 refs.] 1947. Medgis, Leningrad : State Medical Publishing Office. [In Russian.]

This booklet summarizes what is known about all aspects of sandfly fever, with particular reference to recent work in the southern regions of the U.S.S.R. The importance of the disease in the war, and in the post-war period when non-immune workers have been returning to endemic areas, is emphasized.

In Russia sandfly fever is found in Transcaucasia, parts of the Crimea and in the Central Asiatic Republics, including the southern part of the Kirghiz steppes. It is unaccountably absent from parts of this area, notably certain valleys in the Ararat district of Armenia. The author draws attention to the map published by the Medical Intelligence Branch, Preventive Med. Division, Office of the Surgeon General, U.S. Army, 1943 (reproduced in Mackie, Hunter and Worth, *Manual of Tropical Medicine*, Philadelphia : Saunders, 1945) in which dengue is depicted as occurring widely in the southern Ukraine and Transcaucasia. Dengue is not, in fact, known to occur within the borders of the Soviet Union. A somewhat similar error occurs in a variation of this map (*Med. Clinics North America*, New York, 1943, v. 27, no. 3, fig. 83) where the Caucasus and Transcaspian region are shown as within the range of *Aëdes aegypti* and *Aëdes albopictus*. The latter was " based on a mis-identification ", while *Aëdes aegypti* is found round the Black Sea as far north as Tuapse, in Baku and perhaps inland to Tiflis, but not across the Caspian.

Sandfly fever generally appears from June to September with a peak in July or early August. In Tashkent and elsewhere two peaks of maximum incidence have been observed. Infection is seen mostly in children in endemic areas, cases often being seen in children of three years or less. Some 60–70 per cent. of non-immune immigrants contract the disease.

Studies on the vector have been made by distributing sheets of paper smeared with castor oil round likely haunts of sandflies. These are collected every 5–7 days, and the flies are washed off into spirit. Adequate specimens are obtained by this method and it has been used to demonstrate resting places in earth burrows, to determine seasonal population changes and as a useful check on anti-*Phlebotomus* measures. Other species than *P. papatasi* have not been definitely incriminated as vectors, but it was found in parts of southern Kirghizia that 86 per cent. of 2,000 sandflies caught in the homes of patients were *P. caucasicus*, and that in many such houses *P. papatasi* was totally absent. Various workers

have demonstrated transovarian infection of the larvae with the virus and further transmission to females of the second generation. Immigrants to previously uninhabited parts of Turkmenia have suffered from the disease although sandflies in these areas must normally feed on animals.

Details of the gonotrophic cycle are given and it is recorded that the great majority of females undergo one cycle only. Recent work in the Soviet Union has demonstrated certain irregularities in the cycle. Specimens of *P. caucasicus* at certain seasons were observed in which some of the follicles were in the Christophers stage III, while others in the same female were in stage IV. Others were found to have ripe follicles while the stomach contained fresh blood. Studies on flight range in Sevastopol and Teheran showed that in built-up areas stained flies were rarely recaptured more than 25 metres from the point of release, whereas in open country it was found that 74 per cent. flew 150–250 metres, and isolated specimens were caught up to 1,500 metres away.

In conclusion, conventional and newer preventive measures against sandflies are described and figures are quoted to illustrate the results obtained in the prophylaxis of sandfly fever before residual insecticides came into use.

M. T. Gillies

KOPROWSKI, Hilary, COX, H. R., MILLER, Mabel S. & FLORIO, L. **Response of Man to Egg-adapted Colorado Tick Fever Virus.** *Proc. Soc. Exper. Biol. & Med.* 1950, May, v. 74, No. 1, 126–31, 2 figs.

Twelve persons were inoculated subcutaneously in the region of the biceps muscle with virus of the 37th yolk-sac passage of Colorado tick fever. Nine of the twelve developed enlarged and tender axillary glands on the side of the inoculation, and four had also an illness similar to naturally acquired Colorado tick fever except that the incubation period was longer and there was only a single spell of fever. Of the three who gave no clinical reaction two were known to have had attacks of the disease, and the third had lived in an endemic area.

Eight persons were inoculated with virus of the 74th egg passage ; all reacted with a single spell of fever lasting three to four days.

Five of the 20 inoculated persons were challenged, 3½ to 10 months later, with intravenous injections of a human strain of the virus ; none gave any response. Mouse neutralization tests were carried out on the sera of all the inoculated persons and it was found that by the 45th to the 54th day after inoculation the sera had neutralization titres of 50 to nearly 18,000 LD_{50} doses of a strain of virus which had been adapted to mouse brains.

Sera of the three persons who gave no response to initial inoculation were again tested after being challenged with the human strain of virus to which they had given no response 5 to 10 months after the original inoculation. In each case neutralizing antibodies rapidly developed ; in one case the neutralizing titre rose to more than 100,000 LD_{50} doses 65 days after the challenge. [See also this *Bulletin*, 1947, v. 44, 518.]

John W. D. Megaw

PLAGUE

KRUMBIEGEL, I. Eurasische Mäuse als Seuchenueberträger ihre Verbreitung und geomedizinische Bedeutung. [**The Muridae of Europe and Asia. Their Distribution and Medical Significance.**] *Beiträge z. Hyg. u. Epidemiol.* 1948, No. 3, vi+89, 17 figs. [Numerous refs.]

This treatise contains much that will be of interest to the zoologist and even to the general reader. In view of the emphasis laid by the author in the title

on the epidemiological significance of the " Eurasian mice " it comes as a surprise to find that the " true rats " are dismissed in about three pages whereas 15 pages are devoted to the lemmings, 42 pages to the non-domestic mice and the water rat, and 20 pages to the murines or " true mice ".

The 17 maps showing the distribution of certain muridae are necessarily incomplete ; they are specially so for India and other countries of Southern Asia.

A useful feature of the article is the bibliography which is adequate except in the case of the rats concerned with the transmission of plague ; this part contains only ten references, five of which are more recent than 1900.

John W. D. Megaw

HARRISON, J. L. & WOODVILLE, H. C. **Notes on the Feeding Habits of House-Rats in Rangoon, Burma.** *Ann. Applied Biol.* 1950, June, v. 37, No. 2, 296–304, 4 figs.

" During a poison campaign against house-rats, particularly of the species *Bandicota bengalensis*, *Rattus rattus* nr. *khyensis* and *R. exulans concolor*, a number of incomplete experiments were carried out on feeding habits and the take of poison.

" The rats showed a reaction to new objects similar to that of *R. norvegicus* in England.

" A marked preference was shown for boiled rice over any other available foodstuff. The amount eaten was roughly proportional to the surface area of the rat. Barium carbonate in boiled rice was an acceptable poison bait, and the optimum concentration of poison was in the range 10–20%."

ALAIN, M. & REYNES, V. Sur une forme cliniquement et bactériologiquement atypique de peste. [**A Case of Plague, Atypical in its Clinical and Bacteriological Aspects.**] *Méd. Trop.* Marseilles. 1950, Jan.–Feb., v. 10, No. 1, 93–7.

The bacteriological features of this case of plague have already been discussed by one of the authors [see this *Bulletin*, 1950, v. 47, 846].

The case is described as being of the septicaemic-pyaemic type [*septicopyohémique*]. There was a large abscess associated with adenitis of the inguinal glands ; the peripheral nerve reflexes were greatly exaggerated ; a remittent type of fever persisted for two months and the patient became highly emaciated.

The nature of the infection is regarded as problematic ; one suggestion is that it was a form of sylvatic plague, another that the organism was a mutation form of the plague bacillus.

John W. D. Megaw

SOKHEY, S. S. & HABBU, M. K. **Aureomycin and Chloromycetin in the Treatment of Experimental Plague.** *Indian J. Med. Res.* 1950, Apr., v. 38, No. 2, 197–201.

By a series of fully controlled experiments the authors have shown the strikingly curative effect of aureomycin and chloromycetin in mice experimentally infected with plague.

Mice weighing 24 to 30 gm. were inoculated with measured doses of plague bacilli which killed 100 per cent. of untreated animals in less than eight days. The treatment, by oral administration, was started 72 hours after inoculation, so that septicaemia was already established.

Aureomycin, in doses of 1·0 mgm. every three hours for 12 hours, and then every six hours for 10 days, cured 90 per cent. of the mice. With chloromycetin, doses of 8·0 mgm. given at the same intervals were needed to produce the same result.

The authors have already shown that streptomycin, given subcutaneously, gave similar results with a total dosage of 10·4 mgm. as compared with the above oral dosage of 42 mgm. aureomycin and 336 mgm. of chloromycetin.

John W. D. Megaw

ROBERTS, J. I. **An Experiment in Hydrocyanic Acid Gas Fumigation as a Control Measure against Plague.** *J. Trop. Med. & Hyg.* 1950, July & Aug., v. 53, Nos. 7 & 8, 156–62 ; 175–81.

The experiments described are regarded as showing that fumigation with hydrocyanic acid gas in certain conditions is a useful method of controlling rats and their fleas. Most of the field tests were carried out with Cyanogas powder applied by " The Brass Foot-pump Duster " to the thick thatch in which nearly all the rats in rural areas of Kenya live during the day. The powder was introduced into the thatch in as many places as possible by long iron tubes attached to the pump. About two pounds of the powder were used for each hut. At pre-war rates the cost of fumigating 50 huts was estimated to be about £7 10s., and four treatments at monthly intervals in one area appeared to reduce the numbers of rats and their fleas by about 50 per cent.

For areas in which the roofs are of corrugated iron the rats live only in the floors and the cost of fumigating burrows with Cymag was £4 14s. for 320 huts as compared with £7 for Cyanogas. Cymag was not regarded as suitable for fumigating thatch.

The occupants of huts were warned to remain outside for at least one night after thatch fumigation and three nights after burrow fumigation. Little attention was paid to the warnings, but no reports of casualties were received.

In view of the cost fumigation is recommended only when rats are dying or infestation is intense. As permanent measures of plague control rat-proofing of grain stores and better housing are regarded as offering the only prospect of success.

John W. D. Megaw

CHOLERA

GUILHAUMOU, F. Etude bactériologique de vibrions isolés à l'occasion du pèlerinage de la Mecque. **Bacteriological Study of Vibrios Isolated from Pilgrims returning from Mecca.** *Arch. Inst. Pasteur d'Algérie.* 1950. June, v. 28, No. 2, 125–9.

A study was carried out on vibrio strains isolated from the stools of pilgrims returning from Mecca to Algeria, vibrios having been found in six out of 1,702 specimens examined, after a case of cholera had been declared during the course of the voyage.

The strains showed typical morphological appearances but could be distinguished from true *V. cholerae* by their cultural, biochemical and serological characters. All six were haemolytic, but not of the El Tor type. They were not agglutinated by sera prepared against Ogawa or Inaba strains but were agglutinated by their homologous antisera. Complement fixation and Pfeiffer tests gave corresponding results. Saccharose and arabinose were not fermented [mannose was not tested].

Comments are made on the suitable methods for the examination of the stools of suspected carriers : these are on conventional lines. The author prefers Aronson's medium for plating.

John Taylor

KOSHLAND, Marian E. & BURROWS, W. **Quantitative Studies of the Relationship between Fecal and Serum Antibody.** *J. Immunology.* 1950, July, v. 65, No. 1, 93–103, 2 figs. [19 refs.]

In previous work [this *Bulletin*, 1948, v. 45, 898] it had been shown that immune globulin is present in the faeces of guineapigs inoculated with cholera vaccine, but its concentration was found not to run parallel with that occurring in the serum. It had been concluded that faecal antibody was not related to serum antibody in an immediately apparent manner. The relationship has been further investigated.

Guineapigs were inoculated intraperitoneally with cholera vaccine, and the level of antibody was determined in faecal suspensions and serum, by means of a complement fixation test developed by MAYER *et al.* [*Bulletin of Hygiene*, 1948, v. 23, 819], and modified for use with faecal extracts and a particulate antigen. Twenty-four-hour faecal samples were collected from guineapigs every other day, suspended in phosphate buffer at *p*H 8·0 and stored in the cold after separating the sediment by centrifuging. Serum samples were collected on the same schedule. In the tests carried out on the samples only small quantities of complement were fixed owing to the low antibody titres and the highly anticomplementary action of both the faecal suspensions and the vibrio antigen. With the faecal suspensions the antibody titre was found to reach its peak about the sixth day, and none could be detected by the thirteenth day. The serum samples gave a maximum level on the ninth day, a sharp fall occurring around the twelfth day and only small amounts being present on the twenty-fourth day. In view of these differences it was considered that faecal antibody could not be accounted for as a small constant proportion of serum antibody diffusing into the bowel. It was postulated that "antibody liberated in the blood stream accumulates there, while antibody liberated in the intestines is excreted as soon as it is produced". "By assuming that the antibody in the feces was a measure of the rate of antibody production, and that antibody in the serum was destroyed in a first order reaction, a mathematical expression was developed for serum antibody which agrees well with the experimental data."

The following conclusions were drawn :

"a. The agglutinating and complement-fixing antibodies to the vibrio O antigen are closely similar if not identical.

"b. Fecal antibody behaves independently of serum antibody, and therefore is not derived from it.

"c. Fecal antibody is a measure of the rate of antibody formation.

"d. Serum antibody represents accumulated antibody, and decays in a first order reaction.

"e. The correlation between the ratios of fecal to serum antibody and fecal to serum globulin suggests that the fecal globulin also represents the rate of globulin production." *John Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

HOARE, C. A. **Amoebiasis in Great Britain with special reference to Carriers.** *Brit. Med. J.* 1950, July 29, 238–41. [40 refs.]

Entamoeba histolytica is a cosmopolitan and not a purely tropical parasite. Infection with it may give rise to typical clinical symptoms, to non-characteristic symptoms, or to no symptoms at all. In patients with overt symptoms the need for specific treatment is obvious ; in the case of apparently healthy

" cyst-passers " there are differences of opinion as to the need for specific treatment. The majority of those infected with *Entamoeba histolytica* in all parts of the world do not suffer from symptoms due to the infection; symptomatic cases are more common in warm countries than in temperate countries in which they are very rare in the indigenous population.

In Britain some persons harbour infections of local origin, others have infections acquired abroad. After the first world war it was estimated that 7 to 10 per cent. of the indigenous population of this country harboured locally-acquired *E. histolytica*; after the second world war it is estimated that from one to four million persons harbour locally-acquired infections; these are symptomless " carriers " and their incidence in the population is comparable with that found elsewhere throughout the world.

Many with infections of *E. histolytica* acquired in the forces overseas have returned to this country; those of them who suffer from clinical dysentery have been, or will be treated but the symptomless cases escape notice and will contribute to the infection of the indigenous population.

The importance attached to the " carrier " state varies with the views held on the possible risk this state entails to the carrier himself and to others who may be infected by him. Most clinicians and many parasitologists consider *E. histolytica* to be an obligatory tissue parasite and deny that there are healthy " carriers "; these they state, are cases with only minimal gut lesions. Other workers especially on the continent believe that *E. histolytica* is not an obligatory tissue parasite but that it can live commensally in the human gut bowel. *E. histolytica* does live commensally *in vitro* in culture; it can live commensally *in vivo* in monkeys; and symptomless human " carriers " of the infection discharge amoebae containing engorged bacteria but no red cells which indicates a commensal habit. Sigmoidoscopic examination of " carriers " reveals no lesions in the gut wall; furthermore, at post-mortem examination no lesions can be found in the intestine of such cases. " Carriers " may discharge 350,000 non-haemorrhagous amoebae per gramme of faeces (or 35 million parasites daily); it is incredible that such numbers of parasites could infest the intestinal wall without causing symptoms. After purgation, which causes the discharge of numerous amoebae the number of cysts in the stools is lessened for several days; this suggests that the parasites have been swept from within the lumen of the gut. If amoebae all invaded the tissue of the gut wall, bleeding from the lesions would be expected; tests of the faeces of " carriers " for occult blood show none to be present. The case for a commensal phase in the life-history of *E. histolytica* is therefore strong; it is in no way disproved by Faust's demonstration (this Bulletin 1941, v. 38, 590) of minimal lesions in 7 of 13 carriers examined post-mortem and Faust's assumption that undetected lesions must have been present in the remaining 6 was unjustified.

The factors governing pathogenesis of *E. histolytica* are obscure; there may be differences in pathogenicity between races and strains of the parasite. There are races producing large cysts (over 10 μ. and those producing small cysts (under 10 μ). At least 50 per cent. of symptomless carriers harbour the latter which apparently do not produce dysentery in cats will not infect rats and are generally agreed to be harmless to man. The suggested subdivision of the large cyst-forming races into distinct species based on pathogenicity is unjustified; it is doubtful if there are non-pathogenic strains of them as such strains obtained even from symptomless " carriers " produce lesions in experimentally-infected animals. Nevertheless some large cyst-producing strains appear to be less virulent than others for example indigenous British are less virulent for rats than overseas strains. Strains of the temperate climates are usually harmless to their human hosts and autochthonous cases of amoebic dysentery in Britain are probably due to imported virulent strains

among recently reported indigenous cases there is every probability that this was the explanation. Other factors which may influence pathogenicity are variations in susceptibility of the host, this being influenced by a number of factors including associated bacterial infections.

Though there is no certainty that an *E. histolytica* infection in Britain is invariably innocuous the infection need not be regarded with alarm; it would be rational to eradicate by treatment a detected infection with a large cyst-producing strain, to be on the safe side; but infection with a small cyst-producing strain can safely be ignored. *A. R. D. Adams.*

Pessôa, S. B. & Silveira, A. Jr. Nota sôbre a incidência de protozoários intestinais humanos no estado da Bahia, Brasil. **The Incidence of Intestinal Protozoal Infections in Man in Bahia, Brazil.** *Hospital.* Rio de Janeiro. 1950 Mar., v. 37 No. 3, 355–60.

The authors spent three months June—August, 1949, in Salvador, Bahia State, and as there were no valid data on protozoal infections among the people they resolved to study the question at the local Institute of Public Health. They examined the faeces of 300 inmates at the hospital. No patients are admitted to this hospital under the age of 6 years and this must not be forgotten in assessing the results. *Entamoeba histolytica* was found in 49 or 15·3 per cent. in examining a single specimen, three slides, one direct, one after sedimentation and one after staining with strong Lugol's solution. One hundred and twenty-five patients were from the capital and of these 19 (15·2 per cent.) were positive; 175 were from the suburbs and interior and of these 27 (15·4) were positive. As regards age, 157 were between 16 and 80 years and of these 29 (12·1) were positive; at other ages the numbers were too small for valid deduction. Of 80 whites 19 (23·7 and of 88 blacks 11 (11·2) were positive; 187 were coloured and of these 16 (11·6) were positive. Relatively more males were positive than females; 31 of 167 and 18 of 133, or 18·6 and 11·2 per cent. respectively.

Other protozoa among the males and females respectively were in percentages: *E. coli* 25·1 and 35·3; *E. nana* 8·3 and 19·6; *I. bütschlii* 4·7 and 6·0; *C. mesnili* 1·1 and 1·4; *G. intestinalis* 1·1 and 3·0; *Trichuris hominis* in two of the males.

These figures are compared with those of Amaral & Pacheco who in 1945 examined 2,781 at the School for Industrial Apprentices in São Paulo and found *E. histolytica* in 15·0%, *E. coli* in 30·0, *E. nana* in 19·0%, *I. bütschlii* in 7·0%, *G. intestinalis* in 11·47, *C. mesnili* in 0·45 and *I. hominis* in 0·1 per cent. The discrepancy between the São Paulo figure for *G. intestinalis*, 11·47, and that of the authors at Salvador, 2·0, is accounted for by the fact that Amaral and Pacheco's subjects were between 12 and 17 years of age whereas the authors' were between 6 and 50 years and giardiasis is largely an infection of the young. *H. Ewald Sutt.*

Jacobs, L. **The Substitution of Bacteria in Cultures of** *Endamoeba histolytica*. *J. Parasitology.* 1950, Apr., v. 36 No. 2, 128–30.

Since the discovery of media for the cultivation of *Entamoeba histolytica* a quarter of a century ago it has become increasingly evident that its development and behaviour are influenced by concomitant bacteria, without which it has so far been impossible to propagate this parasite in vitro. Attempts to study the rôle of the different species present in the mixed flora have been made by inoculating cultures of *E. histolytica* from single cysts or from amoebae

recovered from sterile liver abscesses, and then adding a selected species of bacteria. In this manner over two dozen species of bacteria (a list of which is adduced) were tested, and it was found that some of them promoted the growth of *E. histolytica*, while others did not. It was also shown that the effect of the various bacteria was not correlated in any way with their taxonomic affinities. Moreover, the behaviour of the same species (*e.g. Bact. coli*) varied in the hands of different observers, probably owing to differences in technique and media used. Other variable factors might be the relative numbers of amoebae (or cysts) and bacteria inoculated in the medium.

In view of these discrepancies, the author has studied this problem by standard methods, using Locke-egg-rice (L.E.R.) medium, into which strain NRS of *E. histolytica*, growing with a haemolytic streptococcus, was inoculated. Attempts were made to substitute this species, by treatment of the culture with penicillin, by the following bacteria : *Salmonella typhi*, *Salm. paratyphi* A and B, *Salm. enteritidis*, *Klebsiella pneumoniae*, *Pseudomonas pyocyanea*, *Shigella dysenteriae* and *Proteus OX 19*. Subcultures were made until transplants made on blood agar plates became negative for the streptococcus.

E. histolytica failed to establish itself in culture with *Pseudomonas* and *Salmonella enteritidis*, while in cultures with *Shigella* and *Proteus* the antibiotic did not remove the streptococcus. However, the substitution was completely successful in the case of *Klebsiella*, and the typhoid and paratyphoid bacilli, with which the amoebae were maintained in culture over 6 months.

C. A. Hoare

HALLMAN, Frances A., MICHAELSON, J. B. & DELAMATER, J. N. **The Cultivation of *Endamoeba histolytica* in a Defined Medium.** *Amer. J. Trop. Med.* 1950, May, v. 30, No. 3, 363–9. [11 refs.]

The authors describe an enriched modification of the Hansen-Anderson medium in which *Entamoeba histolytica* has been successfully cultivated with one (*t*) or more species of bacteria.

Its composition is as follows. *Amino acids* : l—aspartic acid 10 mgm., l+glutamic acid 18 mgm., l—arginine 5 mgm., l—histidine 5 mgm., l+lysine 5 mgm., l—cystine 6 mgm., l+cysteine 5 mgm., dl methionine 10 mgm., dl phenyl alanine 10 mgm., l—tyrosine 3 mgm., l—tryptophane 11 mgm., l—proline 10 mgm., glycine 10 mgm., dl alanine 10 mgm., dl serine 10 mgm., dl threonine 5 mgm., dl valine 10 mgm., l—leucine 5 mgm., dl isoleucine 10 mgm., dl norleucine 10 mgm. ; *buffer* : Na_2HPO_4 1·130 gm., KH_2PO_4 0·272 gm., NaCl 0·2 gm. ; *lipids* : cholesterol 10 mgm. ; rice powder (30–60 mgm./tube) or starch (5–10 mgm./tube) ; *vitamins* : thiamine 40 γ, riboflavin 80 γ, Ca. pantothenate 80 γ, pyridoxine 160 γ, *p*-amino benzoic acid 80 γ, i-inositol 80 γ, choline 160 γ, folic acid 108 γ, biotin 40 γ, nicotinic acid 80 γ ; *minerals* : $FeCl_3.6H_2O$ 125 γ, $MnCl_2.4H_2O$ 5 γ, $ZnCl_2$ 5 γ, $MgSO_4.7H_2O$ 1·5 mgm., $CaCl_2.2H_2O$ 3·5 mgm. ; *carbohydrate* : glucose 40 mgm., glycogen 100 mgm. ; *miscellaneous* : nucleic acid 10 mgm., creatinine 3 mgm., creatine 2 mgm., urea 14 mgm., uric acid 1·5 mgm., H_2O to 100 ml.

All the constituents, except the vitamins, are mixed and dissolved by boiling 1–3 minutes, after which the solution is cooled and the required amounts of vitamins are added from concentrated stock solutions. The final *p*H is 7·35. The medium is distributed in amounts of 4 ml. into tubes which are sterilized at 120°C. for 10 minutes. Rice powder is added just before use.

Tests with the rice component showed that rice powder (Difco) was superior to rice starch, in that it produced heavier growth of the amoebae. The authors have also succeeded in substituting protein for the rice powder. The best kinds of protein were : (*a*) protein extracted from rice powder : 0·5 ml. of

aqueous protein solution was added to 2·0 ml. of the basic medium freed of vitamins ; (*b*) purified human plasma albumin ; and (*c*) human serum mucoprotein (proteose) : 5·5 per cent. and 50 mgm. per cent. aqueous solutions of (*b*) and (*c*) respectively were made, and added in 0·5 ml. amounts to 2·0 ml. of the basic medium. In the rice-substituted media, the carbohydrate concentration of the basic medium was increased by adding to it 250 mgm. per cent. maltose.

Owing to their instability, fresh basic medium must be prepared weekly, and protein solutions every 10–14 days. *C. A. Hoare*

i. Griffin, A. M. & McCarten, W. G. **Some Sources of Variability in Cultures of Entozoic Amoebae. I. The Effect of Age of Culture, Size of Inoculum and Amount of Starch.** *J. Parasitology.* 1950, June, v. 36, No. 3, 238–46, 5 figs.

ii. —— & Michini, L. J. **Some Sources of Variability in Cultures of Entozoic Amoebae. II. The Effect of Age of Inoculum.** *Ibid.* 247–52, 2 figs.

iii. —— & McCarten, W. G. **Some Sources of Variability in Cultures of Entozoic Amoebae. III. Variation in Vitality.** *Ibid.* 253–7, 2 figs.

These three papers from the School of Medicine, George Washington University, describe an extension of the work published previously [this *Bulletin*, 1949, v. 46, 829].

i. The strain used was an amoeba morphologically identical with *Entamoeba terrapinae* grown in association with an atypical strain of *Bact. coli* in liver-serum-broth medium with rice starch added. The cultures were incubated at 30°C. [*E. terrapinae* was found the most suitable amœba for study and the authors suggest, as regards other strains, that " major differences will be of detail rather than principle."]

In different experiments, the size of the inoculum, and the amount of purified rice starch, was varied. The cultures were then incubated for 3 to 7 days and the yield of amoebae counted after fixation with formalin [*loc. cit.*]. It was found that the chief sources of error were associated with the age of the inoculum and the amount of rice starch. The most rapid growth was obtained from an inoculum containing about 1,000 amoebae. The authors find that the yields will be least subject to error if they are determined on the sixth day and if inocula in excess of 10,000 amoebae are used, with a minimum of 20 mgm. of rice starch in each tube of medium.

ii. Following the conclusions arrived at in (i) effect of the age of the inoculum was investigated. As the strain used above was lost, another strain of amoebae, morphologically indistinguishable from *E. terrapinae*, was isolated. This strain was grown with a mixed bacterial flora.

Liver-serum-broth medium with 25 mgm. of purified rice starch, was inoculated with 50,000 amoebae. The age of the amoebae of the inoculum was varied from 12 to 144 hours, and the cultures were incubated for 12 to 144 hours. Under these standard conditions it was found that the maximum yields tended to occur later with younger inocula. The relationship between yield and age of culture was represented by the equation $\log Y = \log Y_0 - kt$., and excellent agreement was obtained between the calculated and observed figures. A similar relationship holds for yield and age of inoculum.

The authors conclude that consistent yields of amoebae will be obtained if there is a constant optimum inoculum, sufficient purified starch to permit continuous growth and if the yield is determined at a constant time within the period of growth. The error in such experiments will be little greater than that inherent in the counting technique.

iii. The variation in vitality of a culture of *E. terrapinae* was investigated by subculturing every 2 days, or every 3 days, with the use of an inoculum of constant volume, 0·2 ml. and 0·1 ml. respectively (the number of amoebae was not determined). The total number of amoebae present in the culture tube at each subculture was determined.

When the numbers of amoebae were plotted graphically against time a periodicity was noted in the 2-day subculture experiment and the 3-day subculture experiment. The whole cycle between the rising numbers of amoebae and the depression of the culture was of a year's duration. During this cycle there were periods during which the numbers of amoebae at each subculture increased for 50–60 days followed by a period of 30–40 days during which they decreased. Two of these subsidiary cycles combined to give a cycle of 180 days. The numbers of cysts present in the 3-day transfer experiment, followed the numbers of amoebae present.

The authors are unable to record any suggestions as to the cause of these cycles. *R. A. Neal*

Mura, D. L'amebiasi in Sardegna. Osservazioni sulla diagnosi in zona endemica. [**Diagnosis of Amoebiasis in an Endemic Area (Sardinia.**] *Acta Med. Italica.* 1950, June, v. 5, No. 6, 176–9. [35 refs.] English summary.

Amoebic infection has shown considerable spread in Sardinia in the last 10 years and this increased incidence is mainly attributed to the presence of troops and of ex-prisoners-of-war who had become infected in Africa or in Albania. The laboratory examination of faeces has shown a steady rise in the percentage of specimens in which *Entamoeba histolytica* is found, from 44 per cent. in 1945 to 60 per cent. in 1949. These protozoa must be carefully looked for if a campaign is undertaken to control what has now become an endemic infection. For such a survey the author advises the examination of specimens obtained fresh after the administration of a saline, such as sulphate of soda. A flake of mucus is selected, as far as possible free of debris, and picked out on a large (7–8 mm. diameter) platinum loop by a winding motion. It is mixed on a slide with a drop of normal saline which has been warmed up to 27°C. A cover slip is applied and the preparation is examined with a 1/12 in. objective under oil immersion. Foreign matter, if picked up with the mucus, tends to interfere with the free movement of the amoeba.

Of every 100 specimens of faeces in which *E. histolytica* was found, 9 also contained *Giardia*, 4 *Trichuris*, 4 *Ascaris*, 2 *Trichomonas*, 2 *Taenia solium*, 1 *T. saginata*, 1 *Ancylostoma* and 1 *Enteromonas*. *J. Cauchi*

El Din Nor El Din, G. **A Preliminary Report on "Wia" (a New Bismuth-Arsenical Compound) in the Treatment of Amoebic Dysentery.** *J. Roy. Egyptian Med. Ass.* 1950, v. 33, No. 5, 518–20.

The author discusses briefly the literature and previous work on Wia or Win 1011 [this *Bulletin*, 1943, v. 40, 913; 1949, v. 46, 1147; 1950, v. 47, 243].

He then describes therapeutic tests on a few human cases of acute and chronic amoebic dysentery and toxicity tests in rats carried out at the Fouad I Institute of Research, Cairo.

The drug was well tolerated in rats in doses up to 500 mgm./kgm. of body weight.

Ten patients with acute amoebic dysentery were given 1 to 2 tablets [amount not stated] thrice daily for a week. It was well tolerated and in some cases

slight clinical improvement occurred but the amoebae did not disappear even in cases where the course was repeated.

A similar course was given to 10 patients with chronic amoebic dysentery who were passing cysts. In all the cysts disappeared and were still absent in 6 cases followed up for 3 months.

The author points out that the drug is less toxic than the other arsenical preparations and is of value in so far as it eradicates amoebic cysts from the stools : it thus reduces the chance of dissemination of the disease. He discusses briefly the significance of the presence of cysts.

It is concluded, however, that the drug "has no definite value in acute amoebic dysentery." [This finding is not in accord with that of De la Garza Brito and Treviño Villaseñor in Mexico (this *Bulletin*, 1949, v. 46, 1147) also in a small number of cases. It is not, however, clearly stated what dosage was used by the present author. The Mexican workers used four to six tablets each of 0·25 gm. daily for 10 days and the drug used was a product of the Winthrop-Sterling Institute, Mexico. The present author states that the preparation was "issued by 'Hoechst'". It is therefore not easy to compare the two series unequivocally.] *H. J. O'D. Burke-Gaffney*

Most, H., Miller, J. W., Grossman, E. B. & Conan, N., Jr. **Treatment of Amebiasis with Bacitracin.** *J. Amer. Med. Ass.* 1950, July 1, v. 143, No. 9, 792–4.

Sulphonamide and penicillin treatment may produce symptomatic and objective improvement in lesions of the colon due to *Entamoeba histolytica* ; presumably this is due to their antibacterial action. The rôle of bacteria in amoebic infection is ill-defined ; when bacitracin is added to cultures of amoebae the amoebae die more rapidly than the bacteria themselves in the cultures. Treatment with bacitracin of some patients suffering from amoebic colitis has caused the disappearance of the amoebae and clinical cure.

At various centres in the United States 51 patients with microscopically proven intestinal infections with *E. histolytica*, either asymptomatic (13 cases) or suffering from dysentery of all degrees of severity (38 cases), were treated with bacitracin. The total daily dosage varied from 40,000 to 120,000 units by mouth, and treatment continued for 5 to 20 days. In only 3 of the 51 patients treated did parasites fail to vanish during the course of treatment ; but 14 other patients subsequently passed parasites again 6 to 350 days after the completion of treatment—in all but 4 of these the parasitic relapse occurred in under 35 days, the average being 20 days. Nine of these patients were re-treated with bacitracin, but 6 of these relapsed a second time. Three of these 6 were treated once more, and there was further parasitic relapse in 2 of them. To summarize : of 51 patients 34 (66 per cent.) were cured as a result of one course of treatment ; of those who relapsed and were re-treated once or twice, 33 per cent. eventually were cured. It was observed that continuation of treatment beyond a 10-day period, or increase of the dose above 80,000 units, did not significantly increase the probability of cure. [The claim of cure was based on an average observation period of 212 days, during which an average of 12 specimens of stool was examined.]

In 8 patients who were moderately or seriously ill with severe dysentery the clinical improvement was striking within the first few days of treatment. (A detailed account of the treatment of severe amoebic dysentery in an Indian seaman illustrates this.) The toxicity of the drug is negligible, as it does not appear to be absorbed ; no detectable level of the drug in blood or urine could be found in 5 patients 2 to 4 hours after single doses of 10,000 to 50,000 units.

The mode of action of the bacitracin in amoebiasis is uncertain ; clostridia and enterococci disappear from the stools during its administration, and it may be that bacteria sensitive to the drug which have invaded the amoebic lesions are destroyed, so promoting healing. Bacitracin is an important addition to the drugs available in the treatment of intestinal amoebiasis ; the use of this drug alone or in combination with the accepted amoebicidal drugs should materially increase the probability of cure. The recommended dose is 80,000 units each day for 10 days. *A. R. D. Adams*

HALL, D. Muriel, MAHBOOB, S. & TURNER, E. E. **Structure and Amoebicidal Activity. Part I. Aliphatic Diamines.** *J. Chem. Soc.* 1950, July, 1842–5.

SOHIER, R. & PELOUX, Y. Amibiase expérimentale du cobaye. [**Experimental Amoebiasis of the Guineapig.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 3/4, 151–6, 2 figs.

The authors describe the results of intracaecal inoculation of guineapigs with trophozoites of *Entamoeba histolytica*. Of 11 animals inoculated with material from dysenteric human stools or with teased-up intestines of infected guineapigs, all became infected and developed lesions similar to those in human amoebiasis. Seven of these rodents died as the result of infection, three were sacrificed *in extremis*, and one survived. Of 22 guineapigs inoculated with cultures, 11 showed parasitized lesions. It is concluded that guineapigs are suitable animals for the experimental study of the pathogenicity and therapy of amoebiasis. [The authors do not refer to an important recent contribution to the same subject by CARRERA and FAUST (this *Bulletin*, 1950, v. 47, 465).] *C. A. Hoare*

CHESTERMAN, C. C. **Human Intestinal Coccidiosis.** [Correspondence.] *Brit. Med. J.* 1950, July 29, 298.

A European of 41 returned from Calcutta by sea and complained of mild diarrhoea, abdominal discomfort, nausea and anorexia. In 1947, he had been treated for dysentery, diagnosed as amoebic, and in the same year he was seen in London as the diarrhoea had persisted. No *E. histolytica* was then found, but the patient improved on folic acid. In 1948, again in India, he was diagnosed as relapsing amoebiasis : later his appendix was removed and stated to be "full of amoebae". In July 1949 in London cysts of *Endolimax nana* only were found in the stools and in February 1950, he appeared fit. The stools were, however, pale and soft and contained *E. nana* cysts and scanty oöcysts of *Isospora belli*. Haemoglobin was 92 per cent. and there was an eosinophilia of 20 per cent.

He was given 1 gm. of bismuth salicylate thrice daily for a week and all symptoms improved. After 10 days, no *I. belli* were found in the stools and the eosinophilia was only 4 per cent

The author points out that the abdominal discomfort, nausea and pale unformed stools were typical of this infection, and were probably unrelated to previous intestinal amoebiasis or sprue. It is suggested that the infection was contracted in the Suez Canal Zone on the homeward voyage, as it is commoner there than in Bengal.

The importance of pathological examinations in the differential diagnosis is stressed. *H. J. O'D. Burke-Gaffney*

ALBORNOZ PLATA, A. Tratamiento de la giardiasis por el clorhidrato de cloroguanida. **Treatment of Giardiasis with Chlorguanide Hydrochloride.** *Rev. Facul. de Med.* Bogotá. 1950, May, v. 18, No. 11, 647–52.

The treatment is apparently successful in a dose of 0·25 gm. daily for 8 days.

DE SOMMERVILLE, E. T. W. Sobre un caso de *Balantidium coli*. **A Case of *B. coli* Infection.** *Rev. Inst. Bacteriológ. Malbrán.* Buenos Aires. 1945–1948, v. 13, No. 1, 58–61.

RELAPSING FEVER AND OTHER SPIROCHAETOSES

BALTAZARD, M., BAHMANYAR, M., HABIBI, A., MOFIDI, C. & SEYDIAN, B. Fièvres récurrentes humaines. Leur transmissibilité par le pou. **Human Relapsing Fevers. Their Transmissibility by the Louse.** *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 309–17, 1 chart.

The authors have studied the possibility of transmitting relapsing fever spirochaetes from one person to another by means of the body louse. Two spirochaetes were used, *Spirochaeta crocidurae* and *S. microti*, both transmitted in nature by *Ornithodorus erraticus*, and considered by the authors to be identical, although the first is found in Dakar and the second in Persia. One strain of *S. crocidurae* and 9 strains of *S. microti* were used; of the latter 4 were isolated from *O. erraticus* and 5 from the brains of rodents in different parts of the country. Twenty-three patients were infected with these 10 strains, either by the bites of *Ornithodorus* or by the inoculation of blood containing spirochaetes, or the contents of infected lice. Clean lice were fed on each patient during the first febrile attack, and then fed either on the patients or the authors themselves for at least 8 days, and then ground up and inoculated into either another patient or a susceptible animal. Out of 95 experiments, 33 for various reasons were considered as of no significance, 48 were negative, and 14 positive. Of these 14 subjects, 13 had been inoculated with 7 strains of spirochaetes, 6 of which were *S. microti*, and one *S. crocidurae*. It is evident, therefore, that the louse is capable of transmitting from man to man a relapsing fever spirochaete which is normally transmitted by the tick *Ornithodorus erraticus*. It is noteworthy, however, that the repeated transmission of this spirochaete from man to man in lice, did not produce any modification in the direction of the louse-transmitted *S. recurrentis*. *E. Hindle*

PRATESI, P., RAFFA, L., BABUDIERI, B. & NASCIMBENE, A. **Some Derivatives of Diphenyldisulfide with Antispirochetal Activity.** *Science.* 1950, June 23, 694–6.

Many years ago MCDONAGH [*Lancet*. 1916, Jan. 29, 236] claimed that bis (2-aminophenyl) disulphide is effective against human syphilis, and the present authors found that it is active also against *Spirochaeta recurrentis* infections in laboratory animals.

Among derivatives of this compound synthesized and tested by the authors, the N-disuccinyl derivative was distinctly better than the parent substance against *S. recurrentis* infections in mice. When the disuccinyl compound is reduced by simple standard chemical procedures, the resulting product is not the corresponding thiol but benzothiazolpropionic acid. Since the same transformation might occur *in vivo*, it seemed possible that the compound's

activity might be due not to the disulphide group but to the benzothiazole derivative which arises from it. This was investigated by testing (*a*) a derivative substituted in such a way as to prevent transformation into a benzothiazole, namely bis(2-methylaminophenyl) disulphide, and (*b*) benzothiazolpropionic acid itself. It was found that, like bis (2-succinylaminophenyl) disulphide, derivative *a* has antispirochaetal as well as antibacterial activity, while substance *b* is completely devoid of activity. This is regarded as proof that the chemotherapeutic activity of these compounds is due to the molecule of the disulphide as such, which probably interferes with some metabolite by oxidizing or keeping oxidized a substance which should be reduced. It would seem from these observations that N-alkyl derivatives of the *o*-amino aromatic disulphides, which are unable to form ring compounds such as inactive benzothiazoles, may be more active and less toxic than the corresponding non-alkylated derivatives.

The anti-spirochaetal activity observed was exercised against *L. icterohaemorrhagiae in vitro*, as well as against *S. recurrentis in vivo*. *E. M. Lourie*

YAWS

Guimarães, F. N. Tentativa de profilaxia da bouba com o tratamento em massa pela penicilina na baixada fluminense. **Attempted Prophylaxis of Yaws by Mass Treatment with Penicillin in a Riverine District.** *Anais VI Congr. Brasileiro de Hig., Rio de Janeiro, 19 a 25 Outubro, 1947.* 301–7.

The district referred to appears to be in Goyaz Province near the border of Matto Grosso. It must be a most unpleasant place to live in. According to the author it is flat, low-lying and marshy, rich in insect transmitters—anophelines, *Phlebotomus*, *Amblyomma*, Simuliidae, Triatomidae and *Hippelates*—and endemic diseases include yaws, malaria, helminthic infestations, amoebiasis, cutaneous leishmaniasis, ulcus tropicum, exanthematic typhus, typhoid fever, *Sarcoptes*, chiggers, myiasis and "probably Chagas's disease", besides tuberculosis and venereal diseases.

Altogether 700 cases of yaws were treated, 429 males and 271 females; 319 (45·6 per cent.) were blacks, 240 (34·3) whites, and 141 (20·1) coloured. More than half (51·4 per cent.) were in the second decade of life. Tables give the numbers in the different stages of the disease, the various lesions they presented and other information.

Better results were obtained by more prolonged treatment, even with small doses, than by short courses even with large doses. Fifty per cent. of the former, when examined serologically by the Wassermann test two years later, had been cured. Those with early disease, primary or secondary stages, were given from 6,000 to 14,000 units daily in 3 doses, for 10 days, totalling 60,000 to 140,000 according to age; those in the later, tertiary, stage from 10,000 to 25,000 units daily, also in three doses for 10 days; total 100,000 to 250,000 units. Of the 700 treated, 45 [not 445 as stated] relapsed, 25 within 6 months, 14 within 11 months, and 6 later than a year after the treatment. Three hundred had a Wassermann reaction carried out; 167 (55·7 per cent.) were negative. This paper, apparently a Congress contribution, has been sent in without adequate revision. Tables are referred to, but the number of the table is in every instance left blank; there are other brackets, presumably for reference, also left blank. Of the 700 cases 445 are said to have relapsed, whereas 45 is meant; the doses of penicillin in one table are given as 4, 3 and 3 units in the day, ranging up to 9, 8 and 8 for adults, and the total dosage,

100,000 to 250,000 is expressed as 100,000 thousand to 250,000 thousand units. Lastly, the paper is entitled "Prophylaxis of Yaws", whereas the whole is concerned with treatment of patients. *H. Harold Scott*

LEPROSY

LASTRA. Distribución y epidemiologia de la lepra. Estudio particular de la endemia española. **Distribution and Epidemiology of Leprosy, especially its Endemicity in Spain.** *Rev. "Fontilles"*. Valencia. 1950, Jan., v. 2, No. 5, 357–66, 1 map.

The general remarks on leprosy, the possible modes of transmission of infection, vitality of the organism, sources of infection, portals of entry, the question of insect transmission, transplacental infection, need no more than mention here, for they are known to all readers of the *Tropical Diseases Bulletin*. The distribution and prevalence in Spain is, however, of greater interest and importance. A census in 1932 gave a total of 883 cases, a number far from the true. In 1949 the census gave 1,708, but that, too, gives no true picture, for the author estimates that there are some 8,000 leprosy patients in the country. Special foci are mentioned: Andalusia where in 1941 a figure of 186 was returned; in 1949 there were 576 reported, an increase due, the author is careful to state, not to fresh influx of cases but to better diagnosis, particularly of early and atypical cases. Next, the north-west, Galician or Castilian provinces, where 66 in 1941 have become 162 in 1949. Into this part come patients entering Spain from South America. Thirdly, the Levantine focus for which no figures are given, but most cases are said to be in Alicante and Valencia, Castellon and Tarragona. Increase here has, it is said, been arrested by solation through the efforts of the leprosarium of Fontilles. Of extra-peninsular foci, there are said to be 125 cases at Santa Cruz, Taneriffe, and 100 in Las Palmas. In 1941 both these together returned only 119. A line map gives the figures for the various Provinces of Spain.

H. Harold Scott

FLOCH, H. Particularités épidémiologiques de la lèpre en Guyane française. **Epidemiological Features of Leprosy in French Guiana.** *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 189.* 1949, Apr., 7 pp.

The records of over 2,000 cases in ten years are considered in this paper. Improved diagnosis has raised the known number of known cases, which are divided into those in the free and in the penal population. The total free cases now number 1,226 against 677 known in 1938, which gives a rate of 4·3 per cent. in a population of 28,500. It is estimated that if undiscovered cases could be included the true rate would probably be 5·7 per cent. Of 787 new cases 53 per cent. showed the first signs before reaching 15 years of age. This is an indication of the activity of the disease. The authors estimate the lepromatous cases at one-third of the whole.

The cases in the penal settlement show that it took thirty years after its establishment before leprosy manifested itself because the inmates were more isolated at first, but it has now spread seriously among the convicts and the incidence is 6 per cent. against 4·3 per cent. among the free, with a large proportion of lepromatous cases. Infection has taken place from the free population. Moreover, family infections are indisputable and are common among school children. Infection of Europeans is very rare and is mainly of the lepromatous type. *L. Rogers*

Montestruc, E., Caubet, P. & Blaché, R. L'endémicité lépreuse à la Martinique en 1948–49. Considérations générales sur la lèpre à la Martinique. Résultats généraux de deux ans de traitement de la lèpre par les sulfones. [**Leprosy in Martinique and Results of Two Years' Therapy with Sulphones.**] *Arch. Inst. Pasteur de la Martinique.* 1950, Jan.–Apr., v. 3, Nos. 1/2, 7–26.

In the ten years 1938–47 the new cases of leprosy in Martinique averaged 57·6 per annum. In 1948 and 1949 suspected cases were sent to the laboratory for investigation and the new cases averaged 88·5. The yearly deaths averaged about 10 per cent. Cures by sulphones led to earlier diagnoses. Among 177 new cases 80 were lepromatous, 46 tuberculoid and 51 indeterminate. During seven years 27·5 per cent. were in children up to 15 years of age, and this young age showed the largest proportion of lepromatous cases. Males and females showed very nearly equal proportions. Schoolchildren formed the largest group. Family infections were frequent. Infections in both conjugal partners were very rare.

Treatment by sulphones yielded very similar results to those of other workers. Infectivity was reduced by their good effects on nasal lesions, so the new treatment also has a prophylactic effect and the question of making the sulphone treatment obligatory in lepromatous cases should be considered.

L. Rogers

Arnold, H. L., Jr. **Diffuse Lepromatous Leprosy of Mexico (Spotted Leprosy of Lucio). An Obscure Early Description in English.** *Arch. Dermat. & Syph.* 1950, Apr., v. 61, No. 4, 663–6. [Refs. in footnotes.]

This form of leprosy progresses rapidly and often terminates fatally in five to ten years. It is mainly limited to Mexico and Costa Rica. It is a diffuse dermal form without circumscribed granulomata. The author calls attention to a description of the disease in a pamphlet of Honolulu of 1886, entitled "Leprosy in India (and Leprosy in Other Countries)", under the name of "Mal de S. Lazaro" of Mexico, from which a quotation is given; this is possibly the first account published in English. *L. Rogers*

Indian Research Fund Association. Rep. Scient. Advisory Board for Year 1948, 78–87. **Leprosy.**

This report deals with leprosy research at the School of Tropical Medicine, Calcutta. Most of the work by Drs. Dharmendra and R. G. Cochrane has been presented to Cuba Leprosy Conference, but the following enquiry is of interest. The frequency with which lepra bacilli were found in the nasal mucosa in 4,072 cases were as follows :—

Type	Skin smears	Total numbers	Nasal smears positive	Per cent. positive
Neural (N)	Negative	2,834	5	0·17
Neural (N)	Positive	447	158	35·4
Doubtful (N?L)	Positive	121	87	72·0
Lepromatous (L) ...	Positive	670	619	92·4

L. Rogers

Llombart, A. Histopatologia de la lepra y de sus formas clinicas en particular. [**Histopathology of Leprosy.**] *Rev. "Fontilles"*. Valencia. 1950, Jan., v. 2, No. 5, 387–99, 37 figs. on 7 pls.

In spite of its containing no really fresh information this contribution to a course of instruction for practitioners and students of leprosy is an excellent piece of work. The letterpress describes the 37 photomicrographs which are reproduced and indicate as clearly as an unstained picture can the histological changes in the different stages of tuberculoid, lepromatous and "non-characteristic" or indeterminate type of the disease. *H. Harold Scott*

de Faria, J. L. Sôbre a natureza da reação de Mitsuda. [**On the Nature of Mitsuda's Reaction.**] *Rev. Brasileira Leprologia*. S. Paulo. 1949, Dec., v. 17, No. 4, 237–47. [64 refs.] [English version 241–4.]

Floch, H. & Destombes, P. Réactions concomittantes de Mitsuda et de Von Pirquet chez 128 enfants atteints de lèpre tuberculoïde et indifférenciée. [**Concomitant Mitsuda and Pirquet Reactions in 128 Children with Tuberculoid and Undifferentiated Leprosy.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 197*. 1949, Oct., 5 pp. [18 refs.]

The authors have previously shown that cutaneous Von Pirquet reactions are usually stronger in areas infected with leprosy than in healthy areas in the form of a non-specific para-allergic reaction. The reverse is also true, for Hansen's bacillus can produce a para-allergic tuberculin reaction. To compare the reactions they have now carried out Von Pirquet and Mitsuda tests in 128 children of 6 to 14 years with benign undifferentiated or tuberculoid lesions and recorded early and late reactions, the results of which are tabulated. They conclude that the results confirm the opinion of Rogers and Muir, based on their epidemiological investigations, that populations of areas where tuberculosis is endemic show a certain degree of resistance to leprosy; but that leprosy does not provoke any immunity to tuberculosis. They add that the use of killed BCG antigen produces results different from those of tuberculin in cuti- or intradermal reactions. [BCG is sufficiently harmless to be worth trying prophylactically in those exposed to infection from a lepromatous case in the household.] *L. Rogers*

Rosemberg, J., Souza Campos, N. & Aun, J. N. Da relaçâo imunobiológica entre tuberculose e lepra. I. Ação positivante do BCG sôbre a lepromino-reação. [**Immunobiological Relation between Tuberculosis and Leprosy. Effect of BCG upon the Positivation of Mitsuda's Reaction with Lepromin.**] *Rev. Brasileira Leprologia*. S. Paulo. 1950, Mar., v. 18, No. 1, 3–23, 3 figs. [19 refs.] English summary.

The authors are engaged in studying tuberculosis and leprosy with a view of determining their immuno-biological relations and the present is the first of a proposed series of papers. This one is an account of the effect of oral administration of BCG on the previously performed lepromin test in 39 children, ranging in age up to 18 months, who had been removed from their leprous parents at birth and who reacted negatively to the lepromin test and to Mantoux 1 : 10. The children were divided into two groups : one of 12 children who were given a single dose of 0·1 gm. BCG ; nine of them became tuberculin-positive. The lepromin tests which had been made 40 days before were still negative 30 days later but became positive between the 10th and 15th weeks, in consequence of the BCG administration in 8 of the 9 ; the ninth, though tuberculin-positive,

remained Mitsuda-negative. This child and three others of the 12 who were tuberculin-negative were still Mitsuda-negative 7 weeks after the BCG vaccination.

The other group, of 27 children, were given daily doses of BCG totalling 1·19 gm. in 28 days. The Mantoux test was doubtful in three, positive in the other 24. As in the first group the lepromin test was negative before the giving of BCG but positive between the 10th and 15th weeks in 25. Twenty-three days after the BCG was stopped the Mitsuda test was again carried out and *all* were positive.

Taking both groups together, 36 of the 39 reacted positively to the Mantoux 1 : 10 (including the 3 doubtful ones) and all but one became Mitsuda positive after the BCG ; the other three who had been tuberculin-negative remained so and also Mitsuda-negative. In only one did the Mitsuda remain negative while the Mantoux was positive. It must not be forgotten that a Mantoux-positive indicates allergy whereas the Mitsuda-positive indicates resistance or immunity. In view of these results the authors recommend vaccination with BCG in the early days of life of all children of leprous parents.

H. Harold Scott

Tisseuil, J. Réaction d'accélération négative dans la lèpre cutanée, positive dans la lèpre tuberculoïde. [**Accelerated Reactions Negative in Lepromatous Leprosy and Positive in the Tuberculoid Form.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 3/4, 138–40.

Negative reactions after the injection of lepromin made from the human bacilli, if the injections are repeated several times, may become positive in "new" [presumably uninfected] subjects, but not in lepromatous ones, but they may be positive in tuberculoid leprosy. The Mitsuda reaction is independent of that due to tuberculin. An accelerated reaction is a new proof that tuberculoid lesions are due to local action of the leprosy bacilli. The author concludes that the repetition of injections of killed acid-fast bacilli, or avirulent cultures of BCG, provoke in fresh subjects local nodules more and more early up to 48 hours, after increasingly large injections ; this occurs in tuberculoid, but not in lepromatous cases. These reactions he calls "accelerated reactions."

L. Rogers

Elliott, D. C. **Leprosy, a Disease of Childhood with special reference to Early Findings in Eye, Ear, Nose and Throat of Children examined at the National Leprosarium at Carville, La.** *J. Pediatrics.* 1949, Aug., v. 35, No. 2, 189–96, 4 figs.

This paper deals with the early diagnosis of leprosy among children in view of the great importance of prompt diagnosis. It is illustrated by some photographs of the early facial lesions. The erythematous rash has been mistaken for measles in one case and for chickenpox in another. The loss of the eyebrows is emphasized. Eye lesions were found on slit-lamp examination in 12 out of the 14 cases analysed, in the form of the characteristic beading of the corneal nerves in both eyes and in one eye in another case. Punctate keratitis is also bilateral. In 11 cases a characteristic vascular change of the limbus was noted. In 8, filaments were observed in the anterior chamber, which arise from the surface of the iris ; this is an early change. A patch of choroiditis was noted in two of the patients. Early affection of the ears, and swelling and tenderness of the tip of the nose, are also characteristic. Epistaxis should lead to search for granulations in the mucous membrane of the septum.

L. Rogers

SCHUJMAN, S. **Transformation of a Case of Tuberculoid Leprosy in Reaction to the Lepromatous Form.** *Internat. J. Leprosy.* New Orleans. 1950, Jan.–Mar., v. 18, No. 1, 11–20, 8 figs. on 2 pls. [14 refs.]

From a discussion of the literature the author concludes that no ordinary non-reactional case of tuberculoid leprosy has been recorded as having evolved into the lepromatous form. He goes on to record a case which 6 years ago had a clear-cut tuberculoid reaction, which retrogressed under chaulmoogra treatment. Nine months later a most severe reaction occurred but also subsided and a year after ceasing treatment new lasting eruptions appeared and became more diffused. Five years later a frank lepromatous condition affecting the skin and nasal mucosa with lepromatous histological changes were found, which contained abundant lepra bacilli and the lepromin reaction was quite negative. The author believes that it is entirely a matter of specific resistance to the leprosy bacillus being lacking and that only reactional tuberculoid cases with weakly positive or negative Mitsuda reactions may evolve into the lepromatous form.

L. Rogers

JAVIER GUILLÉN, D. Lepra incaracteristicasintomatologia y evolución clinica. [**Non-characteristic Leprosy ; Symptoms and Clinical Evolution.**] *Rev. " Fontilles ".* Valencia. 1950, Jan., v. 2, No. 5, 400–424, 9 figs. on 5 pls.

This is another of the instructive series of lectures and demonstrations given for the information of practitioners. A medical man in a country where leprosy is rife, or even where it is known to exist to a less extent, often is confronted with the difficulty of steering between the Scylla of declaring a case to be one of leprosy when it is not, and the Charybdis of telling a patient and his relations that he is not suffering from leprosy when he is, and, moreover, when, as is likely, the disease is in an early stage with good prospect of cure under appropriate treatment. It must be remembered that in a country where leprosy exists there often exist also cases of lepraphobia, if one may coin the term. The author cites cases of acne tuberosa, of sclerodermia, of erythema nodosum and other conditions which had been diagnosed leprosy and the patients had been urged, even forced, to leave their homes in consequence.

The author has reproduced photographs of the lepromatous, tuberculoid and indeterminate types, the last beginning as maculae of varying depth of colour, not infiltrated, without bacilli, or with very few, of no specific structure and of uncertain response to the lepromin test. The proportion of such cases varies considerably ; some authorities state that one-third belong to this type. In regard to age, it has been shown that in the early years of life and in those over 60 years old benign forms predominate ; between 15 and 50 years the lepromatous type is more common ; also the milder forms appear to be more common among females.

The types of indeterminate leprosy, the macular and the polyneuritic, are, says the author, an artificial division, for there is not a definite limit between them and maculo-neuritic and neuro-macular cases occur.

In the present paper the author names three subtypes of the indeterminate macular form, the hypochromic, the erythemato-hyperchromic, and the erythematous. Histologically, some show ordinary simple inflammatory changes, with or without bacilli ; others, pretuberculoid, show epithelioid cells ; others again, the pre-lepromatous, the foam cells. In the polyneuritic, careful examination must be made for zones or patches of anaesthesia, for wasting muscles, for thickening of nerves and trophic changes. He then passes on to describe and discuss the change from the indeterminate to the tuberculoid or

the lepromatous form and occasionally a retrograde transformation of the former to the indeterminate. The change from the indeterminate to the lepromatous may be gradual, or rapid with an urticarial eruption or a leprotic reaction like erythema nodosum. [An article well worth study by those whose acquaintance with leprosy is small.] *H. Harold Scott*

OBERMAYER, M. E., BONAR, S. C. & ROSENQUIST, R. **Diffuse Lepra. The Lucio Form of Lepromatous Leprosy ; Report of a Case.** *Internat. J. Leprosy.* New Orleans. 1950, Jan.–Mar., v. 18, No. 1, 53–8, 4 figs. on pl.

This form was described by R. Lucio in Mexico, where one of the present writers studied it. Its special features are diffuse infiltration of the skin of the whole body and a peculiar type of lepra reaction called the " Lucio phenomenon " or erythema necroticans ; it usually terminates fatally after an average of eight years. The Wassermann and Kahn reactions are positive and the sedimentation rate extremely high. A case is now reported in a Californian of Mexican descent showing the above features. Illustrative sections of the affected skin are given ; these show miliary lepromatous nodules with dilated dermal vessels and inflammatory elements and also of an ulcer with granulation tissue. Abundant acid-fast rods were scattered throughout the affected tissues. Recently better results have been obtained in treatment by sulphones and lookout should be kept for this lepromatous form, which may easily be overlooked, for the patients may appear to be healthy on superficial inspection. *L. Rogers*

SLOAN, N. R., CHUNG-HOON, E. K., GODFREY-HORAN, M. E. & HEDGCOCK, G. H. **Sulfone Therapy in Leprosy ; a Three Year Study.** *Internat. J. Leprosy.* New Orleans. 1950, Jan.–Mar., v. 18, No. 1, 1–9.

This is a report on the treatment of 346 patients in Hawaii for three years with promin, diasone and promizole in 211, 176 and 27 cases respectively, with promising results [some had more than one drug]. Anaemia was easily controlled ; lepra reactions occurred in 99 tuberculoid or lepromatous cases, but were little, if at all, more frequent than in untreated cases ; but erythema nodosum (99 cases) was much more common than under previous treatments, and polyneuritis (9) was often severe and crippling. Of the total 346 cases 289 (83·5 per cent.) were improved, 50 (14·5 per cent.) unchanged, and only 7 (2 per cent.) were worse ; 50 patients have been released. In cases treated early the disease did not progress. Tuberculoid cases as well as lepromatous ones benefited. Bacteriologically negative cases can be treated at their homes, but positive ones should be in institutions. Pregnant patients stand the treatment well. There was no obvious difference between the drugs, in their effect. *L. Rogers*

DE SOUZA LIMA, L. Importância da sulfonoterapia nos dispensários e resultados. [**Results of Sulphone Therapy in Dispensaries for Leprosy Patients.**] *Rev. Brasileira Leprologia.* S. Paulo. 1950, Mar., v. 18, No. 1, 24–32.

[It is a little difficult to assess accurately these results because, though the details of the schemes of treatment are given and the results in general, the numbers of patients suffering from the different types are not mentioned.] The drugs used were Diaminoxyl [not defined] and Diamidine [Diasone]. The patients were attending at the Lapa Dispensary and were of three groups : indeterminate, tuberculoid and lepromatous. Of the first a further subdivision was made into those of less than 4 years' observation who were given

more intensive treatment, two or three dragées daily for 6 weeks, then 2 weeks' rest ; those of more than 4 years received one dragée daily for the 6 weeks and then 2 weeks' rest. None of these has passed over to the lepromatous type so far and the cutaneous manifestations have retrogressed and some have apparently recovered.

Of the second group, those with lesions in the stage of reactions were given 3 dragées daily for the 6 weeks, then 2 weeks' rest, this course being repeated until activity had ceased, and when things were quiet 2 or even 1 dragée daily ; the less active started with 2 and later had 1 dragée daily for the same period as in the other cases. The results were favourable in that the lesions tended to retrogress, but there was no effect on the peripheral nerve lesions.

Those of the third, the lepromatous, group received different treatment according to the clinical condition. Incipient cases were started on 3 dragées daily for 6 weeks, then, after a fortnight's rest, one daily ; moderate cases had 2 daily at first for the 6 weeks, then one daily after the usual interval, for a year ; advanced cases were given 3 dragées daily, for 6 weeks, with 2 weeks' rest, and so on, usually for 2 years altogether. Patients who persevered with the treatment improved and the erythema nodosum syndrome disappeared "in a good percentage of cases" ; some exhibited, temporarily, signs of exacerbation, particularly if there was premature or untimely stopping of the treatment. *H. Harold Scott*

DE MOURA, A. M. Considerações em torno da sulfonoterapia da lepra. [**On Sulphone Therapy in Leprosy.**] *Rev. Brasileira Leprologia.* S. Paulo. 1950, Mar., v. 18, No. 1, 36–42.

This study is based on the treatment of 814 patients ; 747 of the lepromatous type, 50 indeterminate and 17 tuberculoid. Sixty-five did not complete the course ; 24 because of intolerance of the drugs used, Promanide, Diasone [Diamidine], 19 died and 12 absented themselves or evaded treatment. The mode of administration was either intravenously or orally. By the former injections were given daily, except on Sundays, for 3 weeks [presumably each month], an average of 3·06 gm. a day, or 61·2 gm. altogether in the 3 weeks. If there were no signs of intolerance 5 gm. might be given for a dose. These courses were repeated as necessary, some patients receiving up to 1,800 gm. By the latter, orally, the drug was given for 3 months, with one week's rest for every 30 days of treatment. Response to treatment was more prompt with the intravenous route. Side-effects observed when the drug was taken *per os* were gastritis and a more or less generalized pruritus ; these occurred in about 2·9 per cent. The urine was examined regularly for blood, pus cells, albumin etc. ; bacterioscopic examinations were made monthly (25·9 per cent. of the lepromatous patients were negative at the beginning) and the Mitsuda test was also carried out. Clinical improvement, it was noticed, was not always accompanied by corresponding bacterioscopic changes, but in general the amelioration was such that the patients could be allowed out, without danger to others, and could then attend as ambulatory cases. *H. Harold Scott*

FLOCH, H. & DESTOMBES, P. Action des sulfones dans les formes indifférenciées et tuberculoïdes de la lèpre. [**Action of Sulphones in Undifferentiated and Tuberculoid Leprosy.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 294–303.

The authors report the results of the use of the promin, diasone and the parent sulphone during three years on undifferentiated and tuberculoid cases of leprosy. In the indifferent form, of 72 cases 24 improved, 38 were stationary and 10 were worse, but of a further group of 5 pre-lepromatous cases 4 were

better and only 1 became lepromatous. In the case of 30 minor tuberculoid cases, 15 improved, 8 were stationary and 7 were worse, and in the case of 7 reactionary tuberculoids 4 improved and 3 were worse. The authors therefore conclude in favour of the treatment, although chaulmoograte treatment gave nearly as good results, with the important exception that it was not as effective in preventing reacting tuberculoid cases becoming lepromatous. This means that the sulphones are more effective in preventing the disease developing into the infective form, and so they are of prophylactic value. *L. Rogers*

Floch, H. & Destombes, P. Supériorité pratique de la diamino-diphenyl-sulfone (1358 F) sur les sulfones disubstituées dans le traitement de la lèpre. [**Superiority of Diamino-diphenyl-sulphone (1358 F) over Disubstituted Sulphones in the Treatment of Leprosy.**] *Ann. Inst. Pasteur.* 1950, May, v. 78, No. 5, 559–71. [16 refs.]

This paper deals with 101 leprosy cases treated by the parent sulphone, D.D.S., up to seven months with more rapid improvement than is found with the much more expensive promin and other sulphones. It was given orally to 80 patients in tablets of 10 to 20 mgm. in daily doses for 6 days each week, commencing with 40 mgm. and increasing by 20 mgm. every week up to 200 mgm. in adults, with one week's rest after two months, although that is not essential. Intramuscularly, similar doses were given in 21 of the patients, as urinary elimination shows that absorption is sufficiently slow to permit of such doses. Improvement was noted in 74 per cent. of those treated orally and in 91 per cent. of those treated by injection ; only 2 of the 46 patients treated for at least three months showed aggravation of the symptoms. The results were at least as good as under promin or diasone for the same period. Different races showed similar results, for after two or three months' treatment the dermal lesions showed softening. Trophic lesions and ulcers improved or healed, but neurotic symptoms were variable. Improvement was more rapid at first than later, being greatest during the third and fourth months of treatment. Tuberculoid and undifferentiated cases also improved, but to a less degree. Notes of five illustrative cases are recorded. Complications included mild anaemia yielding to iron and rarely gastric symptoms or urticaria. Reactions were not sufficient to indicate suspension of the drug. Bacteriological examinations revealed slow granulation and reduction of the organisms, but negative results were not obtained in lepromatous cases. Thus, similar, and possibly earlier, improvement was obtained as compared with the more expensive sulphones, but it was of a similar nature. *L. Rogers*

Floch, H., Deniel, H. & Destombes, P. Le devenir de la " sulfone-mère " (diamino-diphényl-sulfone) dans l'organisme des lépreux. [**The Fate of Diamino-diphenyl-sulphone in the Body in Cases of Leprosy.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 202.* 1949, Dec., 8 pp.

This is the same paper as that below, with a different title.

Floch, H., Deniel, H. & Destombes, P. Concentration sanguine et élimination urinaire de la diamino-diphényl-sulfone (" sulfone-mère ") chez les lépreux. [**Blood Concentration and Urinary Excretion of Diamino-diphenyl-sulphone in Leprosy Patients.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 3/4, 162–8.

This paper records estimations of D.D.S. in the blood and urine of cases of leprosy treated by the drug. The authors found that under oral administration the concentration in the blood is practically constant at 0·55 mgm. per

100 cc. of blood with daily administrations of 200 mgm., but rises to 0·72 mgm. with a daily dose of 260 mgm. The amount eliminated in the urine is less, for example 152 mgm. of the 200 mgm. daily dose. The drug thus accumulates in the tissues after continued dosage. When it is given intramuscularly the blood concentration is more variable with a gradual fall during the interval between injections given every third day, and it is eliminated more slowly than after oral use, but 400 mgm. doses every other day maintain a satisfactory blood rate. Rest for one day a week, and a week after two months, is justified by the slow excretion of the preparation in the urine. *L. Rogers*

Floch, H. & Destombes, P. Traitement de la lèpre par le 1500 F [succinyl-diaminodiphénylsulfone]. [**Treatment of Leprosy with Succinyl-diamino-diphenyl-sulphone (1500 F).**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1950, Nos. 15/16, 653–9.

This preparation has been used by the authors for two to eight months in 16 lepromatous cases, with improvement in 14. The doses of 1 to 1·2 gm. daily in the case of adults orally, or by intramuscular injection in graduated doses up to 1 gm., showed more frequent reactions after oral than after intramuscular injections. Twelve more patients were treated for only one or two months, and in early cases improvement may be seen within those periods, but in cases of five to ten years' duration improvement is slower. The drug was well tolerated and anaemia was not met with. Nasal lesions improved rapidly and in one case the lepra bacilli disappeared within two months. Histologically, cicatrization, with decrease of the bacilli and fragmentation of the organisms, was noted after several months' treatment. *L. Rogers*

Floch, H. & Destombes, P. Utilisation d'une sulfone monosubstituée (la succinyldiaminodiphénylsulfone ou 1500 F) dans le traitement de la lèpre. [**Use of Succinyl-diamino-diphenyl-sulphone (1500 F) in the Treatment of Leprosy.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 200.* 1949, Nov., 8 pp. [See above.]

Ryrie, G. A. **Thiosemicarbazone in the Treatment of Leprosy.** *Lancet.* 1950, Aug. 19, 286–7.

This is a preliminary report on a drug with some action on the tubercle bacillus, which has been used up to four months only in two tuberculoid and eight lepromatous cases of leprosy, with promising clinical results so far, and some bacteriological improvement. The daily dose (in tablets of 25 mgm.) has been increased from 50 mgm. to 150 mgm. within 4–8 weeks. The advantages claimed are clinical and some bacteriological improvement early, freedom from mental depression and, in the doses used, relative freedom from toxicity. Further trials are indicated. *L. Rogers*

Floch, H. & Destombes, P. La vitaminothérapie D_2 à hautes doses (traitement de Charpy) dans les formes tuberculoïdes et indifférenciées de la lépre. [**High Doses of Vitamin D in the Treatment of Tuberculoid and Undifferentiated Leprosy.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 11/12, 539–44.

See this *Bulletin*, 1950, v. 47, 551.

Feron, J. Quelques échecs dans le traitement de la lèpre. [**Some Failures in the Treatment of Leprosy.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 254–7, 4 figs. on 2 pls.

KERHARO, J. & BOUQUET, A. La notion de lèpre et les conceptions indigènes du traitement en Côte d'Ivoire et Haute-Volta. [**Indigenous Conceptions of Leprosy and its Treatment in the Ivory Coast and Haute-Volta.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 1/2, 56–65.

This is an enquiry into local treatments, chiefly by a long list of vegetable products in the use of which magic plays a large part. They are administered in drinks or baths or are applied to ulcers. Drastic purges are also given and energetic local frictions or scarifications, to which decoctions and vesicating powders are applied. The paper is of historical interest. *L. Rogers*

WINTER, P. D. **Leprosy and its Control in South Africa.** *Internat. J. Leprosy.* New Orleans. 1950, Jan.–Mar., v. 18, No. 1, 23–31, 3 figs.

This paper records valuable up-to-date information on the progress of the campaign on modern lines to control, and eventually to reduce, the incidence of leprosy in a well-to-do community with several thousand cases, in which a century of compulsory segregation of all types had failed. After a brief history of the use of the older methods the present policy is described as the certification of all newly discovered cases and the isolation and treatment of all except "bacteriologically negative and clinically 'inactive' cases", until a board of experts releases those who have been bacteriologically negative for 12 months and who show no activity of their lesions. From 15 to over 35 per cent. of the institutional inmates are let out thus on probation each year and examined at regular intervals for six years before final complete release from control. Close contacts of the newly discovered patients are examined at once and again in the second and fifth years. In the period 1924 to 1947, some 8,822 patients were probationally discharged, 18 per cent. of whom were readmitted for recrudescence or for surgical treatment of perforating ulcers, etc. "A very small proportion of these cases have positive smears."

The organization of the agricultural colonies is next described on usual lines, and then the incidence and types are considered, and it is recorded that: "Leprosy in South Africa is reasonably well under control" and "over the past 35 years there has been a significant reduction in the number of institutionalized European and Cape Coloured patients." Since 1913 the former have fallen from 190 to 56, and the latter from 345 to 75. The peak of 2,200 cases of all races in 1944 has fallen to about 1,930 in 1949. The author points out that the most noteworthy and encouraging feature is the significant decrease in the duration of the disease on admission from 6½ years, and probably higher, in 1926, to an average duration of illness on admission at Westfort during the past five years of 2·4 years. It is estimated that among 8 million Bantu 3,105 active cases (0·39 per mille) are known, and in addition 3,056 released patients are still under surveillance, making a grand total of 6,161 or 0·77 per mille. Thus the Union of South Africa has proved the value of modern methods with treatment by injections of chaulmoogrates. Recently improved methods of treatment should accelerate the control and reduction of leprosy there.

L. Rogers

CHAUSSINAND, R. Transmission réalisée de la lèpre humaine au singe (*Macacus cynomolgus*). [**Experiments in Transmission of Human Leprosy to Monkeys.**] *Rev. Méd. Française d'Extrême-Orient.* 1943, Aug.–Sept.–Oct., v. 21, Nos. 7/8, 627–36.

HANKS, J. H. **Three Factors which may influence the Experimental Transmission of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1950, Jan.–Mar., v. 18, No. 1, 33–47, 1 fig.

This is an interesting account of experimental work with a strain of rat leprosy bacillus which had been passed through rats and Swiss white mice. Each strain was inoculated on separate sides of rats and mice, with and without red blood corpuscles and tissue cells in different tests. For details of the experiments the original paper should be consulted, but the following conclusions are of special interest. The factor of prolonged host adaptation may be an important impediment (on analogy with these experiments) to the transmission of human leprosy to animals. When the inoculated bacilli were accompanied with blood cells as a tissue substitute the development of the lesions was delayed and were eventually surpassed by lesions established with one-hundredth or one-tenth of the same number of bacilli but without added cellular material. Tissue cells inoculated with the bacilli inhibit the development of lesions, and the author points out that the accidental transmissions recorded by ROGERS and MUIR were unlikely to have transferred large amounts of tissue. Further, infected rats can acquire a remarkable degree of resistance during the course of infection established by the inoculation of large numbers of bacilli into multiple cutaneous sites, which may even suffice to cause retrogression of well-established lesions. He therefore concludes that transmission would be more likely to succeed with bacilli freed of excess of tissue débris, by the inoculation of only one site per recipient, and by employing moderate rather than large doses of bacilli. *L. Rogers*

LEVADITI, C., VAISMAN, A., CHAIGNEAU, H. & BARRAT, L. Virulence du bacille de Stéfanski pour la souris. [**Virulence of Stéfansky's Bacillus for Mice.**] *C. R. Soc. Biol.* 1950, Apr., v. 144, Nos. 7/8, 476–7.

The following is a translation of the authors' summary :—

Stéfansky's bacillus, cultivated in rat brain and inoculated intracerebrally into mice, produced not only encephalitic lesions, but a definite tendency to dispersion in the spleen and often in the liver. *H. J. O'D. Burke-Gaffney*

HELMINTHIASIS

CHEN, H. T. **Some Parasitic Diseases in Hong Kong with Emphasis on those caused by Helminths.** Reprinted from *Biol. Bull.* Fukien. 1944, Sept. 20, v. 4, 1–32. [16 refs.]

Although this monograph was written just before the Japanese invasion of Hong Kong in 1941, and published in 1944, the amount and variety of information contained in it makes it worthy of note ; in particular there may be recalled the author's (then) opening sentence " A systematic and thorough study of human parasites in Hong Kong has never been undertaken."

The paper covers a general survey of intestinal helminths in the urban and rural populations and among " boat people " ; a study of records from two hospitals and the medical school ; an examination of many reservoirs and intermediate hosts of helminthic intestinal parasites including domestic animals, snails, fish and other aquatic hosts ; an investigation into the epidemiology of clonorchiasis ; and a review of malaria parasites and mosquitoes.

The 30 pages of the monograph contain much information supported by 14 tables. The following points of special interest emerge from the examination of several thousand samples :—

Ascaris and *Trichuris* were the commonest helminthic parasites found in the stools of the general population : in rural communities, hookworms were the next commonest and in urban communities *Clonorchis* took third place : the findings in the " boat people " were intermediate between the two, with *Clonorchis* and hookworms absent.

Hospital records from 1930 to 1939 showed that (*a*) *Ascaris*, (*b*) hookworms, (*c*) *Clonorchis* and (*d*) *Trichuris* prevailed.

The Chinese were highly infected with (*b*), (*a*) and (*c*) in that order, while the order of prevalence in non-Chinese was (*a*), (*b*) and *Taenia*.

The findings in animals conformed with usual experience : at least 19 species of helminths were found which have been reported as incidental parasites of man. More than 16 species of freshwater snails were studied. Cercariae of *Fasciolopsis buski* and two lesser-known helminths were found, but known carriers of *Paragonimus*, *Schistosoma* and *Clonorchis* were absent.

Among 15 forms of fish food, more than 16 kinds of metacercariae were found : these were found also in various other aquatic hosts.

As none of the snail hosts of *Clonorchis* was found and examination of 7 local food fish was negative for metacercariae, it is concluded that human clonorchiasis in Hong Kong is due to consumption of imported infected fish. The latter were, in fact, found to be highly infected.

The commonest malaria parasites were shown to be subtertian, followed by benign tertian and quartan. There were 11 species of anophelines, of which 6 were known local vectors of malaria. The commonest vectors among these are stated to be *Anopheles minimus*, *A. jeyporiensis* and *A. splendidus*.

Of mosquitoes other than anophelines 47 species had been reported at the time : *Culex fatigans* is the important local carrier of *Wuchereria bancrofti*.

H. J. O'D. Burke-Gaffney

Blanc, F. & Touzin, R. La splénomégalie égyptienne. (A propos d'une observation de splénomégalie égyptienne à *Schistosoma haematobium*.) [**Egyptian Splenomegaly due to** *S. haematobium*.] *Méd. Trop.* Marseilles. 1950, Mar.–Apr., v. 10, No. 2, 201–52, 13 figs. [Numerous refs.]

The condition known as Egyptian splenomegaly was recognized some 50 years ago, but it is only during the last 25 years that its schistosomal origin has been appreciated. Enlargement of the spleen is found in association with schistosomal infestations elsewhere than in Egypt ; *Schistosoma haematobium*, in addition to *S. mansoni*, has now been shown to cause it. No systematic study of Egyptian splenomegaly has so far been undertaken in French Colonial territories where endemic schistosomiasis occurs.

In 1949 the authors saw a physically robust and apparently healthy young man, aged 21 years, who had come to France from Egypt for his military service. His spleen was greatly enlarged ; no proof of a *Schistosoma mansoni* infestation was forthcoming but it was established, cystoscopically, that there were vesical lesions suggestive of a *S. haematobium* infection, though no ova were recovered to confirm the diagnosis. The extensive investigations carried out on this case are described in detail. Operative removal of the spleen, which weighed 2·8 kilograms, was undertaken ; the patient died ten days later, as a result of paralytic ileus. On section the spleen was found to contain very large numbers of *S. haematobium* eggs, and some ova were recovered from the bladder wall

ost mortem. The changes found at necropsy are detailed and are illustrated y photographs and photo-micrographs.

The authors then review, with reference to the extensive bibliography on the ubject the progress of our knowledge of Egyptian splenomegaly over fifty ears. This progress can be divided into 4 stages : (1) the clinical recognition f a high incidence of cases of splenic enlargement in the Nile delta ; (2) the ecognition of the part played by *S. mansoni* in the causation of this ; (3) the ppreciation that schistosomal splenomegaly occurs elsewhere than in Egypt ; nd (4) the discovery that it may also be caused by *S. haematobium* infections. ttention is then directed to the morbid anatomy and histology of the organs nvolved, especially the spleen and the liver, and to the pathology, clinical anifestations, diagnosis and treatment of the schistosomal infections particu- arly in relation to those cases with splenic involvement. These matters are dealt with at considerable length. The text does not lend itself to summary and ppears to have been written to inform, and to stimulate the interest of, French olonial physicians who have been ignorant of or have ignored the probable requency of Egyptian splenomegaly in the territories in which they work. The bibliography is voluminous, and the paper should be consulted in the original by those interested in the subject.

A. R. D. Adams

Watts, N. P. & Boyd, G. A. *Schistosoma mansoni* **Miracidium under Phase Difference Microscopy.** *Stain Technology.* 1950. July, v. 25 No. 3, 157–60. 2 figs.

A miracidium of *S. mansoni* was immobilized by gradual addition of a 1 per cent. solution of chlorobutanol and photographed at the same plane under ordinary bright field and under phase contrast illumination. By the latter method some of the internal structures are more clearly visible, especially the "gut" and nerve centre.

J. J. C. Buckley

Liu, Ch'ien & Bang, F. B. **Agglutination of Cercariae of** *Schistosoma mansoni* **by Immune Sera.** *Proc. Soc. Exper. Biol. & Med.* 1950. May, v. 74 No. 1. 68–72, 4 figs.

"The agglutination of living cercariae of *Schistosoma mansoni* by immune sera in high dilutions is reported. This reaction which occurs in heat inactivated as well as in fresh serum also appears in the serum of monkeys recently infected with trichina. The agglutinin develops early in the acute infections and was absent in four of seven chronic schistosome infections."

Lagrange, E. & Scheecqmans, G. La bilharziose expérimentale du cobaye. **Experimental Schistosomiasis in Guineapigs.** *C.R. Soc. Biol.* 1949. Oct., v. 143. Nos. 19/20, 1396–9. 1 fig.

Eleven guineapigs were exposed to infection with many cercariae of a strain of *S. mansoni* and adult worms were recovered from eight, but the numbers of worms represented only 1 to 2 per cent. of the total cercariae used. Cercariae of the same strain produced 100 per cent. adult worms in mice. In nine of the guineapigs there was pigment in the liver and in two of these there was also pigment in the spleen. The two negative guineapigs were thought to have undergone spontaneous cure. The female worms recovered from the others were sterile and eggs were found in the liver in only three animals : these were scanty and abnormal. Male worms were well developed but in addition to the testes, numbering 2 to 7, most of them possessed supernumerary organs consisting of a mass of genital cells situated behind the testes. In some the

testes were absent. The authors are unable to accept the explanation of the presence of hermaphroditic males in guineapigs as being a response to the absence of females, since in 2 of their series males and females were about equal in numbers and in some of these the extra gonad was present. On the other hand in infected mice where the males greatly predominated, in four instances the worms in copula were both males, one of which was generally immature. The guineapig is thus an unfavourable host for *S. mansoni*, since the parasite is unable to reproduce, development of adults is scanty and abnormal, and the host seems to be able to rid itself of the infection. *J. J. C. Buckley*

Liu, Ch'ien & Bang, F. B. **The Natural Course of a Light Experimental Infection of Schistosomiasis Japonica in Monkeys.** *Bull. Johns Hopkins Hosp.* 1950, Apr., v. 86, No. 4, 215–33, 8 figs. & 2 charts. [19 refs.]

"1. Fifteen *Macacus philippinensis* monkeys were infected with 100–200 motile cercariae of *Schistosoma japonicum* intra-peritoneally. Three of them were killed and autopsied during the acute stage of their illness. Eight surviving monkeys were kept alive for experimental observations for more than four years.

"2. During the acute stage of the disease, by water sedimentation technique, typical matured eggs could be demonstrated in all cases by the second positive stool examination with an average incubation period of 36–37 days.

"3. Daily stool examinations by quantitative acid-etherixylol method showed no regular pattern of egg production. Sudden changes in the diet did not affect the production of eggs.

"4. All of the surviving monkeys, which had been infected with *S. japonicum* 4½ years previously, were demonstrated to still be infected, but the eggs seem more difficult to detect.

"5. During the acute stage of the disease, autopsy of three monkeys showed eggs in the liver and intestines. In one monkey, eggs were also found in the lungs. The pathological changes are mainly a type of foreign body and pseudo-tubercle reaction around the eggs, with mononuclear, polymorphonuclear, and eosinophilic cellular infiltration.

"6. One monkey, which had an infection produced 200 cercariae, died three years after infection. There were early minimal cirrhotic changes in the liver, in addition to pseudo-tubercle reactions around the eggs.

"7. Liver biopsy of nine monkeys, 3½ years after the infection, showed eggs in the liver, with pseudo-tuberate and foreign body reaction as in the acute cases, and no appreciable scarring or residues of old degenerate eggs."

Lan, Y. & Lin, Cho-feng. **Obstructive Jaundice due to** *Clonorchis sinensis.* *Chinese Med. J.* Shanghai. 1949, Dec., v. 67, No. 12, 657–9, 1 diagram.

"A case of extrahepatic biliary obstruction due to *Clonorchis sinensis* is reported and its surgical management discussed."

Faiguenbaum, J., Agosin, M. & Tamargo, A. Distomatosis humana. [**Human Distomatosis.**] *Rev. Med. Chile.* 1950, June, v. 78, No. 6, 384–7. [17 refs.]

Two cases in Chile.

Ramírez Villamediana, J. J. & Vergani, F. Contribución al estudio del ciclo evolutivo de la *Fasciola hepatica* en Venezuela. [**The Developmental Cycle of** *F. hepatica* **in Venezuela.**] *Rev. Grancolombiana de Zootecnia, Hig. y Med. Vet.* 1949, Oct.–Dec., v. 3, Nos. 10, 11 & 12, 817–38, 14 figs. [13 refs.]

Neghme, A., Donckaster, R. & Silva, R. *Diphyllobothrium latum* en Chile. Primer caso autóctono en el hombre. [**First Autochthonous Case of *D. latum* in Man in Chile.**] *Rev. Med. Chile.* 1950, June, v. 78, No. 6, 410–11, 1 fig.

A case in Santiago.

Seiler, H. E. & Norval, J. **Notes on *Taenia saginata* and *Cysticercus bovis*.** *Health Bull.* (Issued by the Chief M.O., Dept. of Health, Scotland.) 1950, July, v. 8, No. 3, 46–7.

The apparent increase in the incidence of *Cysticercus bovis* in cattle slaughtered in Britain in post-war years led to an investigation of the possibility of a corresponding increase in *Taenia saginata* in the human population in Edinburgh, where during the period 1948 and 1949 the incidence of *C. bovis* at the Edinburgh slaughterhouse rose from 0·4 to 1·16 per cent. respectively. The results of enquiries made from general practitioners and hospital physicians suggested that there was no increase in the incidence of human infection with the tapeworm, a view which was supported by the evidence of a decrease in the amount of male fern extract dispensed in the City during the period 1945 to 1949. Investigation of 20 cases of human infection revealed that nearly three-quarters of these were in adult females. This conforms with other data indicating a relatively high infection rate in women and suggests that transmission tends to occur in places where beef is available in the raw state, for example in the kitchen before cooking. *J. J. C. Buckley*

Talice, R. V. & Gurri, J. Relation entre le développement de *Cysticercus racemosus* et le degré de malignité de la cysticercose correspondante. [**Development of *Cysticercus racemosus* and the Degree of Malignity resulting therefrom.**] *Ann. Parasit. Humaine et Comparée.* 1950, v. 25, No. 3, 121–40, 24 figs. [25 refs.]

See this *Bulletin*, 1950, v. 47, 479.

Nájera, L. E. & Mayer, H. F. Hallazgo de la fase larvaria de *Echinococcus granulosus* en la corzuela (*Mazama simplicicornis*) y consideraciones sobre la epidemiologia de esta helmintiasis. [**The Larval Stage of *E. granulosus* in the Deer *M. simplicicornis*.**] *An. Inst. Med. Regional.* Tucuman, Argentina, 1950, May, v. 3, No. 1, 1–9, 6 figs.

The English summary appended to the paper is as follows :—

" The authors report a case of primary multiple hydatidosis with the presence of 8 peritoneal cysts and 7 pulmonary cysts in the *Mazama simplicicornis* deer, new host for the larva of the *Echinococcus granulosus*. Owing to this they enumerate the 9 species described till now, in the genus *Echinococcus*, revising the criterion followed in its identification and they include in the type species, though provisionally, the one found by them."

Kourí, P. & Kourí, Josefina. Discusiones en torno al " *Inermicapsifer cubensis* " (Kouri, 1938). [**Observations on the Biology of *I. cubensis*.**] *Rev. Kuba Med. Trop. y Parasit.* 1950, Jan.–Feb., v. 6, Nos. 1/2, 1–7. [30 refs.]

Johnstone, H. G. & Jones, O. W., Jr. **Cerebral Coenurosis in an Infant.** *Amer. J. Trop. Med.* 1950, May, v. 30, No. 3, 431–41, 5 figs. [14 refs.]

" 1. The first case of cerebral coenurosis to be reported from the Western Hemisphere is presented. Cerebellar exploration revealed numerous daughter vesicles of a coenurus distributed along the brain stem of a twenty-six-month-old

male infant with a history of sudden right hemiparesis, marked ataxia and symptoms due to an increase in intracranial pressure.

"2. Postmortem examination of the brain revealed multiple, pedicellate, ramified and budding vesicles, which covered the ventral aspect of the pons, the medulla oblongata and the interpeduncular space. A coenurus, 3 cm. in diameter, with clusters of scolices arising from the germinal membrane was found, on frontal section of the brain, in the region of the left basal ganglia. A smaller cyst, 1 cm. in diameter, was located in the left frontal lobe.

"3. The parasite in the brain of the infant was identified as the coenurus of *Multiceps multiceps* in accordance with the views of Clapham and other investigators."

NIKOLIC, J. & WEISER, J. Prilog poznavanju profesionalne ankilostomijaze u Bosni i Hercegovini. [**Occupational Ankylostomiasis.**] *Arhiv za Higijenu Rada.* Zagreb. 1950, v. 1, No. 1, 25–36, 3 figs.

The English summary appended to the paper is as follows :—

"The problem of ancylostomiasis and infections by other intestinal parasites in Jugoslav mines was investigated by the staff of the out-patients' department for occupational diseases in Sarajevo. A sample of about 50 stools was collected in every pit. The analysis was carried out by the modified Faust method using $ZnSO_4$. According to the results the infection of stools is widespread. The highest percentage of infected stools was found in Kreka (96%), the lowest in Mostar (36%). In Mostar, trichocephalus was found in larger proportion than ascaris, while in other mines the ascarides were more common.

"Rabditiform larvae of strongyloides were found in Kakanj. There was also one case of infection by the ancylostoma larvae, and one by the ancylostoma eggs. Both cases were so weak that no clinical symptoms could be detected.

"The prophylactic measures concerning intestinal parasites are also discussed."

BONNIN, H. & MORETTI, G. F. Le médullogramme dans l'anémie par ankylostomes. [**The Bone-Marrow Picture in the Anaemia of Ankylostomiasis.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 9/10, 457–61.

The authors give detailed blood and bone-marrow pictures in three cases of pure *Necator americanus* infections in adults, in which the haemoglobin was 40, 40 and 45 per cent., respectively.

In the bone marrow of all three there was an intense erythroblastic reaction with marked predominance of young forms. The granulocyte/erythrocyte ratio was 0·62, 0·82 and 1·07, respectively. There was a moderate eosinophile reaction which was more evident in the bone marrow than in the peripheral blood and was in inverse ratio with the duration of the infection. No megaloblasts were seen.

This study of the bone marrow supports the argument that the anaemia of ankylostomiasis is mainly the result of loss of blood due to the worms or their bites. *L. E. Napier*

SPRENT, J. F. A. **On the Toxic and Allergic Manifestations caused by the Tissues and Fluids of Ascaris. II. Effect of different Chemical Fractions on Worm-Free, Infected and Sensitized Guinea Pigs.** *J. Infect. Dis.* 1950, Mar.–Apr., v. 86, No. 2, 146–58, 1 fig. [15 refs.]

"Guinea pigs were injected intravenously with various ascaris tissues and fluids and also with different chemical extracts prepared from whole worm pulp.

In nonsensitized worm-free guinea pigs a toxic effect resembling anaphylactic shock was observed following injection of the supernatant fluid from centrifuged worm pulp in doses of about 1 g/kg body weight. Removal of proteins by protein precipitants, boiling and complete digestion by pepsin removed this toxic activity, suggesting that the toxic substance is a protein. It was not removed by dialysis. Some dyspnea was caused by the deproteinized extracts, and this latter effect may have been caused by products of protein hydrolysis as it was more marked after partial digestion with pepsin. When ascaris body fluid and whole worm pulp were left at room temperature for 18 hours, an increase in toxicity occurred which may have been due to such substances released by proteolytic activity.

"Guinea pigs could be sensitized with ascaris body fluid by intravenous, intraperitoneal and subcutaneous injection, while inhalation of a mist of body fluid, oral administration and rubbing onto the abdominal skin failed to produce sensitization. Allergic reactions could be obtained only by intravenous injection and in one case by inhalation. Oral, subcutaneous and intraperitoneal administration failed to produce any effect. Guinea pigs sensitized to ascaris body fluid were successfully shocked with ascaris extracts deproteinized by trichloracetic acid but not after phosphotungstic acid precipitation.

"Guinea pigs infected with the larvae of *Ascaris lumbricoides*, *Parascaris equorum* and *Trichinella spiralis* and with nematodes of the genus *Paraspidodera* were found to be hypersensitive to ascaris body fluid. Whole worm and deproteinized extracts of *A. lumbricoides*, isolated ascaris tissues and metabolic products; whole worm preparations of adult *A. columnaris*, *Toxascaris leonina* and *Physalopterà maxillaris*; and guinea pig lung containing ascaris larvae all caused anaphylactic shock in guinea pigs infected with *A. lumbricoides*. Pneumococcus polysaccharides, hemolyzed group A erythrocytes, normal guinea pig kidney and lung, hyaluronidase and hyaluronic acid preparations, and whole preparations of *Macracanthorhyncus hirudinaceus*, *Moniezia expansa*, oligochaete worms and a planorbid snail failed to produce shock.

"Guinea pigs infected with *T. spiralis* were successfully shocked with whole worm and deproteinized ascaris extracts.

"Regarding the chemical nature of the substance causing shock in infected animals, it appears possible that both protein and polysaccharide are involved. The occurrence of widely distributed immunologically related polysaccharides is discussed in connection with their possible role in instigating cross sensitization in infections with various helminths. The importance of finding a means of analyzing the metabolic products of helminth parasites is stressed, insofar as such studies may assist in discovering more specific antigens for use in allergic methods of diagnosis."

Cardenas Montero, A. Acción de tipo histaminico del liquido perienterico del *Ascaris lumbricoides* var. *suum*. [**Histamine-like Action of Perienteric Fluid of *A. lumbricoides* var. *suum***.] *Rev. Med. Chile*. 1950, Apr., v. 78, No. 4, 272–4.

Mercer, R. D., Lund, H. Z., Bloomfield, R. A. & Caldwell, F. E. **Larval Ascariasis as a Cause of Chronic Eosinophilia with Visceral Manifestations.** *Amer. J. Dis. Children*. 1950, July, v. 80, No. 1, 46–58, 5 figs. [Refs. in footnotes.]

The authors record in detail the case of a 2-year-old white girl who gave a history of 5 months irritability with lethargy and loss of appetite, and a mild degree of fever with headache and vague abdominal pains. The abdomen became distended and the liver was enlarged to 5 cm. below the right costal margin and the spleen to 7 cm. below the left. Blood examination revealed

red cells 3,700,000 and white cells 38,000 per cmm., 62 per cent. eosinophiles, and haemoglobin 6·2 gm. By X-rays there was seen to be infiltration in the upper lobe of the right lung, milia of the right base and increased hilar shadows. Liver biopsy showed inflammatory granulomatous foci and *Ascaris* larvae in section. A male *Ascaris* was passed *per anum*. The patient received three courses of hexylresorcinol in treatment ; she was also given a blood transfusion and a high protein diet with vitamins, yeast and iron. Stool examinations did not reveal any more worms or ova. Improvement set in, but two months after the first admission she was brought again with a renewal of symptoms. Dirt from the floor of the family's dwelling-place contained living embryonated ova of *Ascaris*.

In a comment the authors stress the differences between tropical eosinophilia with its fever, leucocytosis, marked eosinophilia and spasmodic bronchitis, and Loeffler's syndrome which some authorities regard as identical and, say the authors, " It would perhaps lead to less confusion to regard them as chronic-severe and transient-mild manifestations of diseases with essentially similar pathogenic bases ". Many have recorded ascariasis of the bowel in Loeffler's syndrome, but not larvae in liver or lungs. Subsequent examinations in the present case have not again revealed any *Ascaris* or the ova and it may be the inflammatory reaction traps and perhaps destroys them in liver and lungs. The authors' view is well summed up in their own words : " . . . Loeffler's syndrome of transient pulmonary infiltrations and eosinophilia may be due in some cases to transient contact of pulmonary tissue with migrating ascaris larvae. . . . Tropical eosinophilia, with more chronic pulmonary changes, and eosinophilia with visceral manifestations may be due to more prolonged contact with an antigenic stimulus. Such a requirement would be fulfilled in those cases of tropical eosinophilia reported to be associated with mites in the respiratory tract and in our case, in which the ascaris larvae were trapped by the extensive hyperergic tissue response ". [The question of tropical eosinophilia and Loeffler's syndrome and whether they are one or two has often been referred to in this *Bulletin*, but special attention may be drawn to the following : 1941, v. 38, 538, 539 ; 1943, v. 40, 720, 721, 948 ; 1944, v. 41, 424, 425 ; 1945, v. 42, 1039, 1040, 1041 ; 1946, v. 43, 860, 861 ; 1947, v. 44, 224, 621.]

H. Harold Scott

RAGHAVAN, N. G. S. & KRISHNAN, K. S. **Some Observations on the Prevalence of Malaria and Filariasis in Sri Harikotta Island, Nellore, Madras Presidency.** *Indian J. Malariology*. 1949, Mar., v. 3, No. 1, 39–56, 1 map & 3 charts.

Sri Harikotta Island became malarious about 1913, after a change in agricultural practice, since when it has suffered repeated epidemics transmitted by *Anopheles culicifacies*, but little attention has been paid to the prevalent elephantiasis. In the present survey the entire population of selected areas was examined clinically, by interrogation and by night blood films for evidence of filariasis. Results are classified by ages. In all ages combined, 22·14 per cent. showed microfilariae, 14·38 per cent. showed filarial disease, the total affected being 36·5 per cent. All microfilariae seen were of *Wuchereria malayi*. Out of 102 showing filarial disease only two showed hydrocele and chyluria and they had recently come from *W. bancrofti* areas. No single patient with established disease showed microfilariae in the blood.

Mosquitoes collected from dwellings were dissected, and developing microfilariae found in 42/169 (24·4 per cent.) *Mansonioides annulifera*, and 3/18 (16 per cent.) of *M. uniformis*. No microfilariae were seen in the other 1,842 mosquitoes of 16 species dissected. Attempts at laboratory infection of several species of mosquito, including *Culex fatigans*, failed except in the case of

M. annulifera. The *Mansonioides* breed in association with *Pistia stratiotes* in ponds contaminated with organic matter, and removal of this plant in one area reduced the numbers of these mosquitoes.

In three cases studied in detail the microfilariae were nocturnally periodic in the blood. Details of hourly counts are given. *G. Macdonald*

Pessôa, S. B. & Andrade, Z. de A. Alguns dados sôbre a incidência da filaria, *Wuchereria bancrofti* na cidade do Salvador—Bahia. [**Filariasis Bancrofti in Salvador, Bahia.**] *Hospital*. Rio de Janeiro. 1950, Apr., v. 37, No. 4, 593–8, 4 figs.

Magalhães in 1928 found 42 of 350 persons, examined by him in Barreiro, with filarial embryos in their blood, 12 per cent. In the middle of 1949 the authors visited Salvador and thought it would be a good opportunity to examine the question afresh and they were able to obtain the blood of 934 (493 males and 441 [not 491 as stated] females) during the night. Forty-three (4·6 per cent.) were positive, 29 males and 14 females (5·8 and 3·1 per cent. respectively). Of the total, 255 were whites and 7 (2·7) of these were positive ; 520 were coloured and 30 (5·7) were positive, and 159 were negroes, 6 (3·7) positive. Thirteen were less than 12 months old and none of these was positive ; 47 were between 1 and five years and 2 were positive ; 8 out of 121 between 6 and 10 years, and 20 out of 312 (6·4) in their second decade were positive. The most heavily infected district was the Uruguai ward where 17 were positive among 178 examined (9·5 per cent.) and here 56 mosquitoes were captured, all of them *Culex quinquefasciatus* [*fatigans*] ; 7 of them on dissection were found to be harbouring the parasite. *H. Harold Scott*

Peel, E. & van Oye, E. Recherche sur la transmission transplacentaire des microfilaires. [**Transplacental Transmission of Microfilariae (Negative Findings).**] *Ann. Soc. Belge de Méd. Trop.* 1950, Mar. 31, v. 30, No. 1, 59–64.

No evidence of the existence of congenital filariasis or of accidental prenatal infection was obtained by the authors. Their observations were carried out on 104 African women who were in confinement at the maternity hospital at Léopoldville, and in all of whom one or more species of filarial infection had been found by blood or skin examination. These comprised 52 with *A. perstans*, 19 with *O. volvulus*, 12 with *Loa loa*, 2 with *D. streptocerca*, 1 with *W. bancrofti* and 18 with mixed infections. The placenta was examined in 91 cases with the following results : The microfilariae of *Loa loa* were found in the placenta in 14 of 19 cases positive for *Loa loa* infection ; microfilariae of *A. perstans* in 18 of 59 positive for *A. perstans* ; microfilariae of *W. bancrofti* in 3 out of 4 positive for *W. bancrofti*. The much greater frequency of microfilariae of *Loa loa* in the placenta than that of *A. perstans* is commented upon. In no instances were microfilariae of *O. volvulus* or *D. streptocerca* found in the placenta.

The 104 women gave birth to 107 children, all of whom were examined for microfilariae in the peripheral blood, but all were negative. Blood from the umbilical cord of 91 was also negative as were also skin scarifications of 27 children whose mothers were infected with *O. volvulus* or *D. streptocerca*.

J. J. C. Buckley

ROMAÑA, C. & WYGODZINSKY, P. Acerca de la transmisión de *Mansonella ozzardi* (Manson) (*Filaria tucumana* Biglieri y Aráoz). **The Transmission of *M. ozzardi*.** *An. Inst. Med. Regional.* Tucuman, Argentina. 1950, May, v. 3, No. 1, 29–34, 8 figs. [15 refs.]

The English summary appended to the paper is as follows :—

" The authors give a short historical survey of the human filaria from Tucumán which is considered to be identical with *Mansonella ozzardi* (Manson, 1897), from the Caribbean and the West Indies. There is made reference to the experiments on transmission carried out by Davis in Northern Argentine and Buckley on St. Vincent. There is described the technique used by the authors for infecting experimentally ceratopogonid flies of the genus *Culicoides* with microfilariae. In the thoracic musculature of these insects there was observed the apparently normal development of the microfilariae through the " sausage " stage until the second larval stage was reached. The very high mortality of the *Culicoides* under laboratory conditions prevented the observation of the complete cycle of development of the microfilariae. The very high rate of successful experimental infection (35·3%), the apparently normal development of the larvae, epidemiological reasons and the coincidence of the authors' findings with those of Buckley make it highly probable that *Culicoides* sp. is the vector for *Mansonella ozzardi* in Northern Argentina."

HUNTER, G. W. & WARREN, Virginia G. **Studies on Filariasis VI. Observations of the Reversal of Microfilarial Periodicity in a Case of Filariasis bancrofti.** *J. Parasitology.* 1950, Apr., v. 36, No. 2, 164–8, 1 fig.

" (1) Ten series of microfilarial counts were performed over a period of 14 months on a patient who contracted filariasis bancrofti in British Guiana. Each series represented a twenty-six hour period during which counts were made at two hour intervals.

" (2) Nocturnal periodicity was observed when the patient followed normal sleeping and waking habits, i.e., sleeping at night.

" (3) Nocturnal periodicity was reversed by altering sleeping hours.

" (4) When the patient slept 4 hours during the day and another 4 hours at night, the microfilarial curve fell between the others.

" (5) Although no treatment was administered at any time, the microfilarial counts progressively decreased from a mean of 46·8 per 20 cmm. in August 1944 to 14·6 in October 1945, approximately six years after being diagnosed."

HARTZ, P. H. **Filarial Orchitis.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, June, v. 2, No. 2, 170–75, 6 figs. [12 refs.]

" A description is given of the microscopic findings in a case of filarial orchitis. The lesions resemble those found in lymph nodes in cases of tropical eosinophilia and are probably due to hypersensitivity."

MAUZÉ, J. & LANGUILLON, J. Le 1-diéthyl-carbamyl-4-méthylpipérazine ou notézine dans la chylurie filarienne en Guadeloupe. (Note préliminaire.) **Diethyl carbamyl methylpiperazine (Hetrazan, Notezine) in Filarial Chyluria in Guadeloupe. (Preliminary Note).** *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 285–7.

The authors have treated 5 cases of chyluria, of which three are described. The first patient was a woman of 25 years with 6 microfilariae [from the context, those of *W. bancrofti*] per thick film of blood, and numerous microfilariae in the

urine. She received 4 tablets of Hetrazan daily for ten days. The microfilariae in the urine gradually disappeared and so did those of the blood. The urine became limpid on the 8th day. In the second patient, aged 16, there were many microfilariae in the blood and in the urine. He was given 3 tablets of Hetrazan daily for 10 days and the microfilariae soon disappeared from both blood and urine. Chyluria ceased on the ninth day of treatment. The third patient, aged 40, had suffered from crises of chyluria for the last 6 years. There were many microfilariae in blood and urine. He was given 4 tablets of Hetrazan daily for 10 days. The microfilariae in the blood and urine gradually disappeared and the chyluria ceased on the ninth day of treatment. In all cases the number of eosinophiles increased during treatment. The reviewer treated a case of chyluria with Hetrazan ; the microfilariae disappeared from the urine but the excretion of protein and cells remained unchanged. *F. Hawking*

Montestruc, E., Blache, R. & Laborde, R. Action du 1-diéthyl-carbamyl 4-méthylpipérazine sur *Filaria ozzardi*. **The Action of 1-Diethyl-carbamyl 4-methylpiperazine (Hetrazan or Notezine) on** *Mansonella ozzardi*. *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 275–8.

Mansonella ozzardi is usually considered to be non-pathogenic, but the authors believe that it may cause adenolymphocele, headache, insomnia, etc., in certain patients. Thick blood films taken about midnight showed that among 105 soldiers of Martinique, 9·4 per cent. harboured larvae of *Wuchereria bancrofti* and 1·9 per cent. those of *M. ozzardi* ; of 110 soldiers of Guadeloupe, 13·6 per cent. harboured larvae of *W. bancrofti* and 2·7 per cent. those of *M. ozzardi* (one man had both).

Two adult patients harbouring larvae of *M. ozzardi* and with vertigo and light persistent headache of 2 months' duration, were given 6 mgm. per kgm. of Hetrazan (base) per day for 10 days. Their symptoms disappeared, as did the microfilariae of their blood. In three other patients (without symptoms) the microfilariae disappeared equally rapidly. In all three patients, the eosinophile count increased during the treatment. There were no symptoms of intolerance. It is remarkable that Hetrazan destroys larvae of *M. ozzardi* although it does not affect those of *A. perstans* which resembles it.

F. Hawking

Germain, A., André, L. & Marty, J. Filarioses à *A. perstans* et à *L. loa* traitées par le 3799 RP. **Filariases, due to** *Acanthocheilonema perstans* **and to** *Loa loa* **treated with 3799 RP (Hetrazan).** *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 283–5.

In the first case, a Senegalese soldier was found to have larvae of *Acanthocheilonema perstans* (about 8 per thick film) in his blood. He was given two courses of Hetrazan, consisting of 4 tablets of 0·1 gm. each per day for 10 days and 8 days respectively. During the first course the microfilariae were reduced from 8 to 1 per thick film. At the beginning of the second course they disappeared completely and stayed absent from the blood. The eosinophile count rose from 24 per cent. to 54 per cent. during the first course ; later it gradually fell to 10 per cent. In the second case, a French engineer suffered from Calabar swellings. He was given two courses of Hetrazan as above. About two weeks after the second course he had swelling of one thenar eminence with the usual sensations of a Calabar swelling. He was given a third course and has since had no more symptoms. There were no signs of intolerance throughout. *F. Hawking*

HECKENROTH, F., BÉCUWE, R., MAYAN, L. & LEROUX, G. Filarioses (*loa* et *perstans*) et dérivés de la pipérazine. [**Filariases** (*loa* **and** *perstans*) **and Piperazine Derivatives** (**Hetrazan**).] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 354–63.

The first patient was a French woman aged 37, weighing 50 kgm. who contracted loiasis in 1935. During subsequent years she suffered from Calabar swellings, pruritus, and the passage of worms under the skin of the face, etc. On August 3rd 1949 the blood contained a few microfilariae of *Loa loa*. On August 11th she was given Hetrazan, 1 tablet progressively increasing to 2, 3, and 4 tablets on successive days, continuing at 4 tablets daily for 7 days (total dose 3·4 gm.). One hour after the first dose, muscular pains occurred in the thighs and legs, and became generalized. During the night, rigors and insomnia occurred. The next day, the patient continued to be confined to bed with general symptoms. The dose was repeated twice and after the first one a papular eruption appeared on most of the body except the face. There was no pyrexia. On the third day, the situation continued. From August 14th to 18th. four tablets of Hetrazan were taken daily and the symptoms persisted ; an inguinal lymph node became enlarged but not painful and the eruption became very pruriginous. On August 19th the blood contained no microfilariae. The general symptoms and headache continued for a fortnight and then disappeared. The symptoms had been attentuated but not prevented by Phenergan, 4 capsules daily. Three months later, the blood was still free from microfilariae and the general state was satisfactory. The case is remarkable for the severity of the allergic reactions provoked by Hetrazan and the long duration (26 days) of a Calabar swelling.

The second patient was an African from the Cameroons, aged 18 years, weighing 69 kgm. He was admitted to hospital on July 27th 1949 on account of general ill-health. There was dullness at the base of the right lung, together with pleural opacity ; systolic murmurs, with many extra systoles and enlargement of the left ventricle, were present. The blood contained larvae of *Acanthocheilonema perstans* and the eosinophile count was 27–36 per cent. The patient was given four courses of Hetrazan, namely 3·4 gm. in 10 days, 4 gm. in 10 days, 4·4 gm. in 11 days, 11·2 gm. in 21 days, the end of the last course being on November 28th. The microfilariae persisted and were still present 48 days after the last course. Repeated examinations of the blood throughout the above treatment showed that the number of microfilariae fluctuated greatly and irregularly, sometimes falling to zero ; but there was no clear relation between the number of microfilariae and the course of treatment. In this patient there was no evidence that Hetrazan affected larvae of *A. perstans* in the blood. On the other hand the patient experienced various attacks of pruritus and urticaria during the courses of Hetrazan therapy which might be interpreted as allergic reactions to material from killed microfilariae or adult worms. The patient's general symptoms improved while he was in hospital.

[The clinical histories of these two cases are presented and discussed in great detail.] *F. Hawking*

SCHNEIDER, J. Traitement de la filariose à *F. loa* par la l-diéthyl-carbamyl 4-méthylpipérazine. [**Treatment of Filariasis due to** *L. Loa* **by Diethylcarbamyl 4-methylpiperazine** (**Hetrazan**).] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 270–75.

Treatment was given to 71 patients in Paris since July 1948. All but three had symptoms of loiasis, and 50 of the cases were of less than 2 years' standing. The symptoms included Calabar swellings (93 per cent. of cases), pruritus

(54 per cent.), passage of worms across the conjunctiva (45 per cent.), eczema and prurigo (28 per cent.) and joint pains, headaches, etc. (19 per cent.). Microfilariae were present in 45 per cent. of the cases, and in the others the intradermal reaction to antigen was demonstrated. Treatment was given in 2 courses of 10 days, separated by an interval of 10 days ; and in many cases 2 other courses were given, separated by 3–4 weeks. Where malaria was suspected, appropriate treatment was given before attention was given to the filariasis. The daily dose was 0·4 gm. (base) (or 0·3 gm. in certain females). To diminish the allergic reactions which sometimes occur in the first course, the dose on the first day of all was 0·1 gm., on the second 0·2 gm., on the third 0·3 gm., and on the fourth and subsequent days 0·4 gm. In 30 per cent. of the patients this course was tolerated without toxic reactions apart from very slight nausea and asthenia. In 70 per cent. there were allergic reactions, mostly during the first 3–4 days, comprising pruritus, fugitive erythemata, arthralgia, headache and nausea ; in rare cases there was diarrhoea or fever. Calabar swellings and creeping sensations under the skin were common. All these reactions responded promptly to antihistamine drugs, *e.g.*, Neo-Antergan (3 capsules per day) or Phenergan (one per day). The results were favourable. After the first course practically all the symptoms and signs disappeared ; pruritus in old patients was often more persistent. Microfilariae disappeared rapidly from the blood. The adult worms tended to appear under the skin and to die after forming small nodules. The eosinophilia (unless it was already high) increased. The second course of treatment (which is necessary to avoid relapse) was much better tolerated. In order to be certain of cure (eradication of all worms) it is advisable to give two further courses. *F. Hawking*

Bonnin, H. & Moretti, G. F. Preuves clinique et biopsique de l'action léthale d'un dérivé de la pipérazine sur la filaire *Loa loa* adulte. [**Clinical Evidence, supported by Biopsy, of the Lethal Action of a Piperazine Derivative (Hetrazan) on the Adults of** *L. loa*.] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 279–82, 1 fig.

A man aged 46 had been infected with *Loa* in Nigeria in 1940. Since 1942 he had suffered from Calabar swellings, prurigo, etc. In July 1949 he was treated with Hetrazan, 3 tablets [amounts not specified] daily for 10 days. On the sixth day a small weal 10 × 1 mm. appeared in the iliac fossa. Biopsy was taken and later two more courses of Hetrazan were given, without further worms appearing. Similar weals (indicating dead worms) have been seen in many other patients. The time of their appearance is variable and so is their number. They occur in about one case in six. They measure 10–15 mm. long and 1 mm. wide ; they are pink, but not pruriginous or oedematous. The worms occur mostly on the back, breast, waist or abdomen. These reactions can be differentiated from allergic reactions because the latter are pruriginous, extended, and appear early in the first or second days of treatment. Histological examination of the biopsy in the present case showed (1) the remains of the dead worms, (2) a necrotic basophilic material ensheathing them, (3) a strong reaction of histiocytes ; eosinophils lay more distally. *F. Hawking*

Otto, G. F. & Maren, T. H. **Studies on the Chemotherapy of Filariasis. Parts V–VII.** *Amer. J. Hyg.* 1950, May, v. 51, No. 3, 353–95, 4 figs. [Numerous refs.]

Part V. Studies on the Pharmacology of Arsenamide and related Arsenicals. pp. 353–70.—Arsenamide is a compound which has been recommended for the treatment of human filariasis [Thetford *et al.*, this *Bulletin*, 1949, v. 46,

68]. It is the dithioglycollate of $OAs.C_6H_4.CONH_2$. Detailed studies were made of its acute and chronic toxicity in laboratory animals and the distribution of arsenic in the tissues following treatment. With single intraperitoneal injections into mice the LD_{50} is about 11·0 mgm. As per kgm, which is approximately the same as that of oxophenarsine (mapharsen). Three rabbits tolerated a single intravenous dose of 2·0 mgm. As per kgm. but one of three died after 4·0 mgm. Two dogs tolerated a single dose of 2·7 mgm. As per kgm. but two others died after 4·0 mgm. Cotton rats tolerated daily doses of 0·9 mgm. As per kgm. by intraperitoneal injection for 45 days. Four rabbits tolerated 21 daily intravenous injections of 1·0 mgm. As per kgm., but three rabbits receiving 2·0 mgm. As per kgm. died in 4–9 days. Six dogs tolerated daily intravenous doses of 0·9 mgm. As per kgm. for 15–47 days, but three dogs receiving 1·8 mgm. daily died in 3–10 days. Apparently the drug is more toxic when given to rabbits or dogs by intraperitoneal injection ; subcutaneous injection caused localized inflammation. One monkey receiving 1·35 mgm. As per kgm. daily intravenously died in 8 days ; but two other monkeys receiving 1·35 mgm. and one receiving 1·8 mgm. daily gained weight, as did three others receiving smaller doses. [Doses as low as 0·2 mgm. As per kgm. daily for 15 days are apparently effective against *D. immitis* of dogs and *W. bancrofti* of man.]

Determinations of arsenic content were made on the organs of these various animals. There was no appreciable accumulation of arsenic in the tissues of any of the animals.

The liver of monkeys killed 48 hours after the last dose contained about 70–136 μgm. per gm., the kidney about 6–10 μgm., the other organs contained much less, erythrocytes contained about 5–22 μgm. and the plasma about 14–40 μgm. The concentration of arsenic in the worms (*Dirofilaria* or *Litomosoides*) was about as high as in the liver. In animals which died from the drug, the concentration in the liver and kidneys was much greater than these amounts, possibly because the organs of these animals were unable to cope with the arsenic and the resultant injury caused still further accumulation. There was no evidence of histological damage in any of the organs of these animals. The arsenic is excreted nearly equally by the faeces (especially via the bile) and the urine, usually totalling 10–20 per cent. of the dose in 48 hours. Either buffered or unbuffered solutions of arsenamide are stable for two years when stored in amber ampoules in the dark at 0°C. at room temperature. When stored in rubber-stoppered bottles there was deterioration after 15 months. Various other related arsenical compounds were also studied briefly.

Part VI. Studies on the Excretion and Concentration of Antimony in Blood and other Tissues following the Injection of Trivalent and Pentavalent Antimonials into Experimental Animals. pp. 370–85.—This describes various studies which have been made incidental to the testing of antimonial compounds in smaller laboratory animals. Since the distribution varies greatly according to the species of animal studied the results are only an approximate indication of what might be expected to occur in man. In general, trivalent antimony has a marked affinity for the red blood corpuscles, but within 24 to 48 hours it diffuses out of these cells again to be stored in certain tissues, especially the thyroid and liver. Pentavalent antimonials are not bound by the red cells to any appreciable extent even when the plasma concentration is high ; their highest concentrations occur in the thyroid and liver, but fairly high ones may also be found in the spleen, kidney and lung. In most species of mammals pentavalent antimonials tend to be excreted in the urine rather than in the faeces, and trivalent compounds tend to be excreted in the faeces rather than in the urine. However, the relative amounts excreted by these two routes depend quite as much on the species of animal as on the valency of the

preparation. The mouse tends to excrete especially in the faeces while man and dog tend to excrete especially in the urine. Much work has been done to discover whether pentavalent antimonials must be reduced in the body before they can act, but the evidence is too conflicting for any definite conclusion to be reached. [This paper contains numerous valuable data about the distribution of antimony in the animal body, and it should be consulted in the original by those interested.]

Part VII. Comparative Review of the Possible Therapeutic Agents available for Canine and Human Filariasis. pp. 385–95.—This paper reviews the recent literature up to the early part of 1949. The agents include :—

Trivalent antimonials—these have some action on *D. immitis* ; Anthiomaline has been reported as partially effective on *W. bancrofti* ; but in general they are considered to be insufficiently active in doses which can be tolerated.

Pentavalent antimonials, e.g. neostibosan. This appears to kill or sterilize the adults of *W. bancrofti* and *L. loa* if given in prolonged maximum tolerated courses. It is not effective against *Onchocerca.*

Trivalent arsenicals, e.g. arsenamide. This acts principally on the adult worms, and THETFORD *et al.* [this *Bulletin*, 1949, v. 46, 68] obtained good results in a few patients infected with *W. bancrofti.*

Piperazines, e.g. hetrazan—which acts primarily on microfilariae, and which is the best therapeutic agent yet known for filariasis in man.

Cyanines—which act on the microfilariae and adults in cotton rats, but which have been disappointing in man.

The compounds are classified according to whether they act chiefly on adults or microfilariae. [This classification is theoretically justified but the reviewer disagrees with the proposed distribution of the compounds in these two categories.] *F. Hawking*

IBRAHIM, K. G. **Microfilaria in Vitreous (Onchocerciasis).** *Bull. Ophthalm. Soc. Egypt.* **1947**, v. 40, 91–2.

RUIZ REYES, F. Observaciones con la dietilcarbamazina (Hetrazan) en la zona oncocercosa de Oaxaca. **Observations on Hetrazan in an *Onchocerca* District of Oaxaca.** *Medicina.* Mexico. 1950, June 10, v. 30, No. 605, 225–30.

The author starts with a reference to the report of MAZOTTI and HEWITT on the results of giving Hetrazan in a dosage of 2 mgm. per kilo bodyweight twice daily for 7 to 10 days and 14 to 21 days [see this *Bulletin*, 1948, v. 45, 532], later modified by giving 4 mgm. per kilo, two or three times daily for 8 days. It is not easy to treat the general population of a district because they go about their business or are apathetic. The author, however, treated 1,483 persons in 16 villages, 1,017 males and 466 females, of ages up to 60 years ; 301 (20 per cent.) were between 11 and 15 years of age and 548 (36·9) between 6 and 15 years. Pruritus, oedema and rise of temperature were common after the earlier doses, but only three cases of actual intolerance are mentioned ; one who had a slight cardiac lesion and in whom the first dose caused a prolonged and troublesome tachycardia ; secondly, a woman 6 months pregnant, who showed signs of a threatened miscarriage, which, however, did not take place ; thirdly, a lactating woman whose child, 10 months old, was attacked by bradycardia and dyspnoea.

Before treatment was begun, biopsy of the skin of neck and shoulders was made to determine the degree of infection and any nodules were removed ; if there were more than 10 or 15 of these the removal was carried out in two sessions. If after the course filarial embryos were still found, this was attributed, not to failure of the drug, but to the presence of some overlooked nodule.

Of the 1,483 treated, in 1,026 biopsy after treatment revealed no microfilariae and 457 showed a marked diminution in numbers. It must not be forgotten that those living in an "Onchocerca zone" are liable to constant re-infection, hence the treatment and removal of nodules should, it is recommended, be repeated periodically and at least twice a year. *H. Harold Scott*

LINDBERG, K. La draconculose en Asie particulièrement en Moyen-Orient, avec liste des Cyclopides recueillis dans les régions endémiques. [*Dracunculus medinensis* **Infection in Asia, especially the Middle East ; Cyclopidae collected in the Endemic Areas.**] *Rev. Paludisme et Méd. Trop.* 1950, Apr. 15. v. 8, No. 71, 87–111, 4 maps & 5 figs. [Bibliography.]

This study of the historical and present-day distribution of *Dracunculus medinensis* in Arabia, Iran and Russian Turkestan is based upon personal enquiries and observations as well as upon reference to early and modern literature. This is contained in an extensive bibliography which is classified under the three main geographical headings. There is also a comprehensive list of species of Cyclopidae which were found in regions of endemic dracontiasis, past and present, in southern Iran, with observations on their habitats and altitude. *J. J. C. Buckley*

HUANG, A. C. C. **Acute Ceco-Colic Intussusception in Adult caused by *Trichuris trichiura* Infestation. Report of a Case.** *Chinese Med. J.* Shanghai. 1949, Dec., v. 67, No. 12, 660–61.

"Intestinal intussusception of parasitic origin in adults is a very rare condition. A case of acute ceco-colic intussusception due to *Trichuris trichiura* infestation occurring in a woman is reported. The local irritation of the worms and spasm of the intestinal wall play an undebatable part as the cause of the condition."

MARTELLI, T. & ZAFFINO, C. Sulla frequenza dell'infestazione da "Oxyurus vermicularis" nelle collettività infantili. [**On the Incidence of Infestation with *Enterobius vermicularis* in Child Institutions.**] *Nuovi Ann. d'Igiene e Microbiol.* 1950, Mar.–Apr., v. 1, No. 2, 9–11. English summary (3 lines).

Using the Cellophane method introduced by the Americans, the authors have been studying the incidence of threadworm infestation in children. A strip of adhesive Cellophane tape, 4–5 cm. long, is held by one end, either in the thumb and first finger, or a pair of smooth-faced forceps of the type used for holding cover-slips, and the strip is stuck on the anal area so as to cover and adhere to the whole anal margin. The strip is then sharply pulled off and applied with its adhesive surface to a glass slide, which is then examined under the microscope for eggs of the helminth.

In a previous paper, the authors have reported on the examination of 220 children of either sex, aged 2 to 12 years, selected at random in the outpatient department and belonging to a wide range of social classes ; 74 of these (33·6 per cent.) were then found infested with threadworm.

The series on which they report now consists of 515 children, both sexes, aged 6 to 12 years, who were inmates of 4 child colonies in Rome, where the hygienic and sanitary conditions were considered to be most satisfactory. Up to 3 examinations, at weekly intervals, were carried out where necessary. In this way 370 children (71·84 per cent.) were found to be infested with the helminth, and only 145 (28·16 per cent.) gave negative results throughout 3 consecutive examinations. An eosinophilia was found to be present in a high

percentage of cases and its presence is suggestive where other signs and symptoms, even pruritus ani, may be absent. The preventive importance of diagnosing this commonest of all helminthic infestations is obvious, and so is the advantage of this technique over the older method of obtaining and examining stools. *J. Cauchi*

ERRATUM

In the abstract of the paper by GAASE [this *Bulletin*, 1950, v. 47, 559] the experiments with guineapigs are not correctly reported. The 3 guineapigs received the infective feed *after* having received the three injections of antigen. The 5 guineapigs received the infective feed *before* receiving the three injections of antigen.

The numbers of *Trichinella* larvae recovered from the 3 guineapigs which received infection *after* antigen were smaller than the numbers recovered from the 5 which received infection *before* antigen.

DEFICIENCY DISEASES

SYMUL, F. Etude des protéines sériques des indigènes d'un centre extra-coutumier : Léopoldville. [**An Investigation of the Serum Protein Levels of Africans in Léopoldville, Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1950, June 30, v. 30, No. 2, 295–311.

Estimations of protein and protein fractions were carried out, by salt precipitation and biuret methods, upon the sera of (1) 120 adults chosen at random, (2) 69 African policemen, whose diet was supervised and who were considered physically fit, (3) 11 African newborn infants, and (4) two European newborn infants. At the same time, three liver function tests were performed upon the sera of the 69 police, and the serum protein values for the 20 whose liver function proved normal were averaged separately from the remainder. The results of these estimations, compared with normal European values, are summarized in the following table (condensed from those of the author).

Mean serum protein levels (in gm. per 100 ml.)

Group	Total protein	Albumin	Total Globulin	α Globulin	β Globulin	γ Globulin
Normal European adults	7·01	3·77	3·24	1·10	0·94	1·20
120 African adults, chosen at random	6·365	2·754	3·611	0·711	1·002	1·898
69 African policemen apparently physically fit	6·144	2·755	3·389	0·676	0·899	1·814
20 of the above policemen, showing normal liver function	5·977	2·934	3·043	0·694	0·847	1·502
11 newborn African infants	6·505	3·526	2·979	0·442	1·212	1·325
2 newborn European infants	6·271	3·236	3·099	0·219	1·327	1·288

Among the African adults, even those apparently healthy and fit, there is, compared with European normals, a low level of total serum protein, a low albumin level, an inverted albumin/globulin ratio and a relatively high level of γ-globulin.

The similarity of the values found in newborn African and European babies leads to the conclusion that the adult differences are not racial but must be attributed to environmental causes affecting the life of the individual, particularly the generally low level of animal protein intake, parasitization and helminthic infestation, and hepatic dysfunction resulting from malnutrition in infancy. *Dean A. Smith*

MENON, P. S., TULPULE, P. G. & PATWARDHAN, V. N. **Phrynoderma : Clinical and Biochemical Investigations.** *Indian J. Med. Res.* 1950, Apr., v. 38, No. 2, 173–86. [29 refs.]

Follicular hyperkeratosis (phrynoderma) has been recognized for more than 20 years as a manifestation of malnutrition. On account of its common association with xerophthalmia and night-blindness it has generally been assumed to be a sign of vitamin A deficiency and the response of the condition to treatment with cod liver oil and vitamin A concentrates dissolved in oil has lent support to this assumption. The work of GOPALAN [*Bulletin of Hygiene*, 1947, v. 22, 524], however, suggested that some constituent of the oil itself, rather than the vitamin A, might be the curative factor, possibly unsaturated fatty acids.

Forty-eight girls with phrynoderma were the subjects of the present study. Analysis of their diets showed a very low level of fat intake (8 gm. daily), but an apparently adequate vitamin A intake (3,920 I.U. daily). Deficiency signs such as xerophthalmia, Bitôt's spots and mouth lesions attributable to ariboflavinosis were rare.

Analysis of the serum lipoids was carried out on fasting blood samples of the subjects and of a comparable control group. The values for the iodine number of plasma fatty acids of the phrynoderma group (mean 96) were significantly lower than those of non-phrynoderma cases (mean 121·6).

The subjects were then divided into groups and, for six weeks, given different treatments, including marmite ½ oz. daily, gingelly (*Sesamum indicum*) oil ¼-oz. daily, marmite and gingelly oil, or reconstituted skimmed milk. Apart from these additions the diet of all remained unchanged. There was a uniformly good clinical response to gingelly oil, accompanied by an increase in the unsaturation of plasma fatty acids, average iodine number rising from 96 to 118. The addition of marmite did not enhance the effect and marmite alone produced no change. The children receiving skim milk improved in general condition but their follicles were unchanged.

These results strongly support the hypothesis that phrynoderma is due to essential fatty acid deficiency.

[These results are convincing and important. But, as the authors fairly point out, the problem of the aetiology of phrynoderma is not, unfortunately, solved. Follicular hyperkeratosis has been produced experimentally in human subjects by pure vitamin C deficiency and cured, in the experimental cases, by administration of ascorbic acid [*Bulletin of Hygiene*, 1948, v. 23, 707]. It is increasingly evident that the chains of enzyme systems and biochemical reactions that maintain the function and integrity of cell groups are very complex and that a break in the chain at one of several different places may give rise to the same clinical syndrome. It is possible that unsaturated fatty acids, certain aminoacids, B-complex factors, vitamin C and even the

discredited vitamin A may all be necessary for keeping the skin healthy and that under different conditions deficiency of any one of them may result in that cell dysfunction that manifests itself as phrynoderma.] *Dean A. Smith*

Pieraerts, G. Syndrome de dépigmentation-oedème (Kwashiorkor) au Kasaï. Essais thérapeutiques. III. [**Depigmentation—Oedema Syndrome (Kwashiorkor) at Kasai, Belgian Congo. Therapeutic Trials. III.**] *Ann. Soc. Belge de Méd. Trop.* 1950, June 30, v. 30, No. 2, 287–94.

The author adds four strikingly successful cures of severe kwashiorkor to those previously published [this *Bulletin*, 1950, v. 47, 265]. He used substantially the same technique as that described and re-emphasizes the value of serum transfusion in those severe cases in which the degree of intestinal dysfunction makes " alimentary reproteinization " impossible.
Dean A. Smith

Rao, P. K. **Treatment of Infantile Cirrhosis of the Liver.** *Indian Med. Gaz.* 1950, Apr., v. 85, No. 4, 150–53. [13 refs.]

In 1941 the author suggested that portal or Laennec cirrhosis, long known to be common among Hindu children, might be due to a combination of two causes : (1) the use of cow's milk in infant feeding, and (2) *Bact. coli* infection. His suggestion is that shortage of certain B complex vitamins, especially choline, in which cow's milk is assumed to be deficient, causes liver damage which makes that tissue unduly susceptible to low-grade infection which results in the formation of cirrhosis (*Proc. Indian Acad. Sci.*, 1941, v. 14, 310). The present paper records the treatment of two groups of infants.

The first group of early cases, in whom neither jaundice nor ascites had developed, were given proprietary milk foods (strongly urged in preference to cow's milk), protein hydrolysate, supplementary choline and a vaccine of *Bact. coli*. There was recovery in four of the six cases. In three other cases the dietary régime was similar but *Bact.* coli vaccine was replaced by streptomycin. All recovered.

[The clinical results in these cases are striking and may well be important. The line of reasoning about the aetiology of the condition is, however, not entirely logical. It has not been found possible to confirm the statement that the choline content of cow's milk is inferior to that of human milk. The methionine content of cow's milk is the higher. But even if this assumption is true, the named proprietary milk-foods, strongly advocated when breast-feeding is impossible, are, in fact, made from cow's milk and their content of choline and other factors cannot be superior, unless they are used in a concentration higher than that advocated by the makers. The author's contention may be sustained if by " cow's milk " he means a greatly diluted and otherwise unhygienic product sold in the markets of some Indian cities, but this is not clear in the paper and even in this case the blame should rest on the handling methods rather than on cow's milk itself.] *Dean A. Smith*

Brinkman, G. L. & Prior, I. A. M. **Chronic Beri-beri Heart Disease. Report of a Case.** *New Zealand Med. J.* 1950, June, v. 49, No. 271, 266–71, 6 figs. on 2 pls. [16 refs.]

" A case is reported in which congestive heart failure with myocardial and endocardial fibrosis, mural thrombi and cardiac hypertrophy of probable nutritional origin, developed seven years after the period of most severe dietetic deficiency. A brief review of chronic beri-beri heart disease is presented."

HAEMATOLOGY

MAIER, E. H. Erythrozytometrische Studien im tropischen Westafrika und Beschreibung einer Makroplanie beim pneumoniekranken Neger. [**Erythrocytometry in Tropical West Africa : A Case of Macroplania in Pneumonia.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, July, v. 2, No. 1, 59–68. [23 refs.]

The English summary appended to the paper is as follows :—

" 1. Diameters of erythrocytes were measured in 296 diseased negroes of West Africa (Fernando Po). Interpretation of results was rendered difficult by chronic malaria.

" 2. There is reason to assume that febrile stages cause macroplania (occurrence of large and flat erythrocytes).

" 3. Macroplania during the course of pneumonia is described ; connection of fever and macroplania is evident.

" 4. Cause and origin of macroplania in pneumonia is discussed."

FRAZIER, C. A. & RICE, C. E. **Neonatal Sickle Cell Anemia.** *J. Amer. Med. Ass.* 1950, July 22, v. 143, No. 12, 1065–7, 1 fig.

" The case of the youngest patient with sickle cell anemia in crisis to survive with a follow-up is here reported. The occurrence of sickle cell anemia in the newborn is considered rare, but there is a possibility that it may have occurred more often than has been recognized. This possibility must be kept in mind in the consideration of jaundice or anemia in a Negro patient of this age group."

VENOMS AND ANTIVENENES

GONÇALVES, J. M. & VIEIRA, Laura G. Estudos sôbre venenos de serpentes brasileiras. I. Análise eletroforética. [**Studies on the Venoms of Brazilian Snakes. I. Electrophoretic Analysis.**] *An. Acad. Brasileira de Ciencias.* 1950, Mar. 31, v. 22, No. 1, 141–50, 6 figs. [10 refs.]

The English summary appended to the paper is as follows :—

" Electrophoretic patterns of snake venoms from Brazil have been obtained in barbiturate-citrate buffer pH 8·6, μ=0·1. A great deal of variation in the distribution of proteins occurs among different species of snakes.

" The variation that appears as a function of the physiological condition of the animal has been pointed out for samples of Bothrops Jararacussu from the same region. Moreover striking differences are observed taking in consideration the geographic distribution of the identical species Crotalus T. Terrificus : the Crotalidae from North, Center, or South, of Brazil show distinct electrophoretic diagrams from animal to animal.

" A new basic protein, crotamin, has been revealed in the meridional venom of Crotalus T. Terrificus, the pharmacologic effects of which, are quite distinct from those of crotoxin.

" The variability in the composition of the venoms awakes our attention on the paraspecificness of the anti-serum and emphasizes its preparation according to the toxic factors of a regional venom."

Ghosh, B. N. **The Enzymes and Enzyme Inhibitors contained in Snake Venoms.** *Immunity Bull.* 1950, Apr., 102–8. [19 refs.]

Lucey, J. F. **Fatal Spider Bite.** *East African Med. J.* 1950, June, v. 27, No. 6, 244–5.

A healthy African adult in Mbeya, Tanganyika, was bitten by a spider in the calf of the right leg. The bite was very painful, the surrounding skin was turgid and the deeper tissues were indurated. The bite was scarified and treated with potassium permanganate crystals and morphia was given. The same evening the patient appeared to be acutely conscious of approaching death and died shortly afterwards.

At autopsy the only lesions of note were congestion of the glomeruli and the heart vessels and some round cell infiltration in the liver.

Although the element of fear appeared to play a part in the cause of death, further enquiries were made and from a number of spiders found two were collected which were said to be identical with those which had bitten the patient. These were identified at the National Museum of Southern Rhodesia as female specimens of *Latrodectus indistinctus*, a genus whose species are universally recognized as being dangerous. This species is widely distributed in South Africa where it is known colloquially as one of the " Knoppie Spiders " [this *Bulletin*, 1936, v. 33, 402].

The zoologist who identified it stated that its occurrence was known in Southern Africa only as far as Livingstone in Northern Rhodesia and hence the record from Mbeya was unique. He believed that the species of *Latrodectus* are the only spiders whose venom is dangerous to man, but he refers to grave illnesses caused in the Cape Province by *Harpactirella lightfooti* [this *Bulletin*, 1940, v. 37, 518].

The author has since found that the spider is quite common in Mbeya District. It is black, with a crimson spot on the end of the abdomen and usually lives in the bottom of stubble or bushy growth, in dry places or in earth burrows. Its web is particularly tough and when probing for the spider, the finger should not be used. *H. J. O'D. Burke-Gaffney*

Murray, R. E. **Bite by Funnel Web Spider.** *Med. J. Australia.* 1950, July 1, v. 2, No. 1, 16.

Furman, D. P. & Kurtpinar, H. **Residual Toxicity of Chemicals for Black Widow Spider Control.** *J. Econom. Entom.* 1950, June, v. 43, No. 3, 343–7.

" Laboratory screening and residual deposit spray tests as well as residual spray field tests were made for control of the black widow spider, *Latrodectus mactans*. In screening tests the methoxychlor was eliminated as being relatively ineffective. In residual tests, toxaphene, dichlorodiphenyl dichloroethane, and aldrin were found to be relatively ineffective. Lindane, technical benzene hexachloride, and chlordane were relatively effective, but not as persistent as DDT which was effective in laboratory tests for over 16 weeks when applied at the rate of 150 mgm. per square foot of surface.

" In field tests lindane at 18 mgm. and DDT at 100 mgm. per square foot of surface provided effective control and protection from reinfestation for over 12 weeks and 6 weeks respectively, when the experiments were terminated."

DERMATOLOGY AND FUNGUS DISEASES

Gómez, R. F. Investigaciones sobre la endemia de coccidioidomicosis en la zona central del Chaco paraguayo. Sus primeros resultados. [**Investigations into the Endemic of Coccidioidomycosis in the Central Zone of the Paraguayan Chaco. Its First Results.**] *An. Facul. de Med. Montevideo.* 1950, Apr., v. 35, No. 4, 639–52, 1 map & 1 graph. [24 refs.]

Following on the successful use of the coccidioidin skin-sensitivity test in epidemiological surveys in the United States, investigations by this test on the existence of local foci of the infection in South America were made by Negroni, Daglio & Briz de Negroni ; and Negroni & Briz de Negroni [this *Bulletin*, 1949, v. 46, 1175], Ginés, Gould & Melgarejo de Talavera [*ibid.*, 1950, v. 47, 400] and Campins, Scharyj & Gluck [*ibid.*, 775].

The Paraguayan part of El Gran Chaco may be divided into three topographical areas ; a large eastern zone suitable for tillage and grazing, a small north-western area of desert and sand dunes, and a large central area formed of an arid plain on which the annual rainfall is only 500 to 700 mm. The climate of the central zone is hot, with temperatures ranging from 40° to 44°C. and over ; violent winds blow throughout the greater part of the year and carry clouds of fine, penetrating dust and the vegetation consists mainly of low forest of stunted shrubs, chiefly thorns, and a great variety of cacti. The rains, which fall especially in December and January, form little oases in depressions which are infested by many different species of rodents. The general climatic and geological features are similar to those of the endemic areas of coccidioidomycosis in the United States. This central area of the Chaco is the scene of oil prospecting operations by the " Union Oil Paraguay " and, as the persons engaged in this work had been in the area for many months they offered suitable material for a survey of the region by the coccidioidin test. In addition to the employees of the oil company, the author included in his investigation a number of the indigenous Indian inhabitants. The test was carried out according to the customary procedure and the grading of the results followed the scheme used by Ginés *et al.* In the total of 291 persons tested, 24·3 per cent. gave positive and 75·7 per cent. negative results. Of the 71 reactors, 39 were recorded as +, 26 as ++, 5 as +++, and 1 as ++++. Among 186 Paraguayan employees the incidence of reactors was 15·5 per cent. but 82 local Indians yielded 43·9 per cent. reactors and of 10 Americans 5 gave positive results. Among the employees there were two cases of clinically manifested primary coccidioidomycosis and three presumptive cases.

From the results of the survey, the author concludes that the central zone of the Paraguayan Chaco is an endemic area of coccidioidomycosis.

J. T. Duncan

Negroni, P. & Radice, J. Formación de endosporos en el *Coccidioides immitis* observado con la luz de Wood. Su posición sistemática. [**Formation of Endospores in *C. immitis* observed with Wood's Light. Its Systematic Position.**] *Rev. Inst. Bacteriológ. Malbrán.* Buenos Aires. 1945–1948, v. 13, No. 1, 355–60, 3 figs. on pl. [21 refs.] English summary.

A number of strains of *Coccidioides immitis* from sources in both North and South America were studied in their parasitic form in guineapigs' tissues by means of fluorescence microscopy. The technique of this method, which consists of examining, with the aid of filtered ultraviolet rays, preparations stained with a fluorescent dye, was described by Carlos, Radice and Negroni

in a previous report [this *Bulletin*, 1949, v. 46, 571]. The formation of endospores in the spherules of *C. immitis* in tissues takes place by successive cleavages of the zone of peripheral protoplasm surrounding the large central vacuole. In this way polyhedral masses called " protospores " by Fonseca are cut off. Subdivision by a similar process yields smaller uninuclear elements which are the definitive spores. These bodies develop a limiting membrane, become swollen, rounded and enclosed in a thick refractile spore-wall and constitute the endospores of the fungus. The existence of residual protoplasm or epiplasm was not determined. Fusion between mature spores, which are about 5 μ in diameter, may occur within the sporangium or in the free state.

Significant points in connexion with the systematic position of the fungus are that the endospores are not uniform in size or in the stage of their development, and their number is not necessarily a multiple of 2. A discussion, supported by many citations and references from the literature, on the nature of the parasitic spherule, reached the inevitable conclusion that it is not an ascus. In the authors' view it is a sporangium and they follow Ciferri and Redaelli in placing the fungus in the *Phycomycetes*, but they leave its more precise classification to a future discussion. *J. T. Duncan*

Bass, H. E. **Recent Advances in Knowledge of Fungous Diseases of the Lung. With special reference to Coccidioidomycosis and Histoplasmosis.** *J. Amer. Med. Ass.* 1950, July 22, v. 143, No. 12, 1041–4. [27 refs.]

Mackinnon, J. E., with the collaboration of Noemí García-Zorron. Naturaleza o significado de la forma en " rueda de timón " de *Paracoccidioides brasiliensis*. [**The Nature and Significance of the " Steering-Wheel " Form of** *Paracoccidioides brasiliensis*.] *An. Facul. de Med. Montevideo.* 1950, Apr., v. 35, No. 4, 653–68, 18 figs. [17 refs.] English summary.

Reproduction by simultaneous, multiple buds from all parts of its surface is a characteristic feature of *Paracoccidioides brasiliensis* in parasitic life and in cultures vegetating in the yeastlike form at 37°C. Langeron (*Précis de Mycologie*, 1945, p. 646) has drawn attention to the resemblance of the multiple-budding form of *P. brasiliensis* to figures of the Phycomycete *Boudierella coronata* by Costantin, which show a large spore bearing a number of secondary conidia on short stems arising from various parts of its surface. Redaelli and Ciferri considered that the multiple budding of *P. brasiliensis* may represent a form of cryptosporulation, and they compare it to the case of *Amoebochytrium rhizidioides* in which motile, amoeboid spores pass through the wall of a sporangium.

Yeastlike forms are known to occur in some species of the Mucoreae, in fact, it is commonly believed that some of the brewing yeasts used in the Far East are derived from species of *Mucor*. With this in view, the authors studied a strain of *Mucor* sp., which reproduced by sporangia, zygospores (homothallic) and chlamydospores. When grown in liquid media, the higher forms of reproduction were suppressed but the production of chlamydospores was very abundant. The chlamydospores budded-off yeastlike cells, and these thin-walled yeasts reproduced by multiple budding in a manner apparently similar to that seen in *P. brasiliensis*.

Two conclusions may be drawn : firstly that *P. brasiliensis* resembles fungi which belong to the class of Phycomycetes, and, secondly, the phenomenon of multiple budding is a vegetative process and not a form of sporulation.

J. T. Duncan

Lacaz, C. da S. Associação da sulfadiazina e sulfamerazina no tratamento da blastomicose sul-americana. Niveis sanguíneos obtidos. Profilaxia dos acidentes sulfamídicos. [**Combination of Sulphadiazine and Sulphamerazine in the Treatment of South American Blastomycosis. Blood Levels obtained. Prevention of Sulphonamide Complications.**] *Hospital.* Rio de Janeiro. 1950, May, v. 37, No. 5, 689–708. [23 refs.] English summary.

Before 1938, South American blastomycosis in its systemic form was almost inevitably fatal, but the introduction of treatment by the sulphonamide drugs, for which the chief credit must be accorded to Padilha Gonçalves, has provided a means of cure in the majority of cases. The present report substantiates the excellent therapeutic results from sulphonamides recorded by Quiroga *et al.* [this *Bulletin*, 1949, v. 46, 168] and by de Barros [*ibid.*, 1950, v. 47, 777].

Sulphadiazine should be used undissolved to insure slower absorption and a more uniform concentration of the drug in the blood. The dosage recommended is 1 gm. by mouth every 6 hours, and a blood level of 1·1 mgm. per 100 ml. is sufficient to have a therapeutic effect. However, the best results are obtained from combined sulphadiazine and sulphamerazine given in doses of 0·5 gm. each, by mouth every 3–4 hours. In all cases, chemotherapy should be supplemented by dietetic management and general symptomatic treatment and, if feasible, by specific vaccine therapy. The effects of the sulphonamides *in vivo* are fungistatic and not fungicidal, and success in treatment must depend, in some measure, on efficient phagocytosis of the parasites. The best therapeutic results are obtained in the cutaneous, mucous and pulmonary forms of the disease, but the glandular type is much more resistant, probably because of fibrotic changes which protect the parasites. The response to treatment also varies with the individual patient and with the extent and duration of the disease.

Care must be taken to guard against the complications of sulphonamide treatment, especially the effects of these drugs on the liver, the blood-forming organs and the kidneys. To a great extent, these complications are avoided by the use of the combined sulphadiazine-sulphamerazine treatment which is well tolerated even in large dosage ; blood levels, determined by the method of Bratton & Marshall, reaching 8 to 13 mgm. per 100 ml. in severe generalized and glandular cases and 2 to 6 mgm. per 100 ml. in the milder cutaneous cases. The blood level of the drug varies, however, with individual patients on a uniform dosage and some become resistant to the drugs. Treatment must therefore be controlled by periodical blood examinations. Fluids and alkalis should be given freely.

An analysis of the results of treatment of 29 cases by single sulphonamides, or by the combination of sulphadiazine and sulphamerazine, is set out in tabular form.

The author concludes by inviting more attention to the immune-allergic factor in this disease. *J. T. Duncan*

TROPICAL OPHTHALMOLOGY

Short, D. S. **Conjunctival Ecchymosis as a Complication of Malaria in British Troops stationed in Bombay.** *J. Trop. Med. & Hyg.* 1950, Mar., v. 53, No. 3, 54–7, 1 graph. [12 refs.]

Conjunctival ecchymosis as a complication of malaria in British troops is discussed by Short. After a period of field training in the Bombay district

32 cases of malaria were admitted into the Military Hospital, Bombay, from one battalion in a fortnight. Six of the patients admitted during the first week developed conjunctival ecchymosis. In three of these, additional haemorrhagic phenomena were noted, *viz.* epistaxis, purpura and haemoptysis. There was no evidence that drugs or coincidental infection played any part in the causation.

Malaria parasites (*Plasmodium vivax*) were found in four of the six cases. The failure to find parasites in two of the cases can be explained by self-medication before reporting sick. In a seventh case in which conjunctival ecchymosis occurred during the course of an acute febrile illness, *P. falciparum* and *P. vivax* were found in the peripheral blood.

The ecchymoses developed between the third and seventh days and rapidly spread to cover the lower half of the sclera. In four cases both eyes were affected.

This complication of malaria, first described in Greece, appears not to have been previously reported from India. *E. O'G. Kirwan*

BLUMENTHAL, C. J. **Malnutritional Keratoconjunctivitis. A Disease of the South African Bantu.** *South African Med. J.* 1950, Mar. 18, v. 24, No. 11, 191–8, 18 figs. (1 coloured).

Malnutritional keratoconjunctivitis, a disease of the South African Bantu, is divided by Blumenthal into seven clinical types.

A. Corneal softening or liquefaction (without secondary infection).

Type 1. Spontaneous or clean prolapse in which the cornea dissolves away quietly and insidiously at one small point, usually in the lower segment. The eye is nearly always white with not even the suggestion of a ciliary flush.

Type 2. "Nipple" or "teat" type, in which there is corneal softening with expansion and hypertrophic thickening.

Type 3. "Pseudo-Buphthalmic" type in which there is general corneal softening with expansion and attenuation.

B. Corneal softening and liquefaction with secondary infection as the dominating influence.

Type 4. Infected perforating ulcer with prolapse and *iris adherens*.

Type 5. Gross central scarring with hypertrophic thickening of the cornea, in which there is no perforation and no corneal ballooning.

C. Catarrhal keratoconjunctivitis.

Type 6. Acute form in which there is excessive lachrymation, increased mucus, a little pus and severe photophobia. Impetigo of the face, nose or ears is sometimes present.

Type 7. Pseudo-trachomatous malnutritional keratoconjunctivitis which results from recurrent low-grade attacks of the acute form (Type 6) acting over many years, is seen mostly in the older Bantu and is almost indistinguishable from old trachoma.

Malnutritional keratoconjunctivitis in the Union of South Africa is directly linked to those evils which threaten the immediate future of the people, namely, loss of soil fertility, soil erosion, sloth, ignorance, indifference towards, and the abuse of, the land. Lack of quality in food is more important in producing nutritional changes than lack of quantity. Malnutritional blindness is numerically the only important cause of preventable blindness in the young in the Union.

The author is of the opinion that the causative factor is lack of vitamins B. and C, more especially B. *E. O'G. Kirwan*

TOULANT, Madeleine. Manifestations oculaires des trypanosomiases humaines. Maladie du sommeil—Fièvre de Rhodésie—Maladie de Chagas. [**Ocular Manifestations of Trypanosomiasis, African and American.**] Préface du PR. P. TOULANT. 104 pp. [Bibliography.] 1950. Paris : Masson et Cie, 120 Boulevard Saint-Germain. [400 francs.]

The author as a result of a study of numerous articles by various writers has written this book to show the rôle of trypanosomiasis as a cause of eye disease and blindness in tropical Africa. He at first gives an interesting account of the history, parasitology, frequency, histopathology, experimental work on animals, and the general symptoms of the disease.

The ocular manifestations are for the most part benign and transient but quite frequently relapse. He points out that the oedema of the eyelids reported by some writers is considered quite common. Conjunctivitis in the human variety only occurs as a secondary infection although common in the trypanosomiasis of animals. Interstitial keratitis also, so very common in the disease in animals, rarely occurs in man. When present in man it is usually due to an accompanying onchocerciasis or syphilis or leprosy. According to some authors, trypanosomiasis can affect the iris, ciliary body and more rarely the choroid. The inflammation of these tissues appears early in the disease, is generally unilateral, and is slight, transient and clears up often without treatment. Relapses, however, do occur. The diagnosis is often very difficult. Cases of choroiditis have been reported by careful observers but in the light of our present knowledge this is more commonly due to an accompanying onchocerciasis.

Lesions of the optic nerve are also reported by various writers and are more serious. These are stasis of the optic nerve head, papillary oedema, papillitis, optic neuritis and optic atrophy. The exact part played by the trypanosome in the aetiology remains obscure. Pathological proofs are very rare. Experimental work has shown that the trypanosome can invade the tissues of the optic nerve, the choroid and retina, but whether the lesions produced are due to the direct action of the trypanosome or of a toxin, or constitute an allergic phenomenon, still remains in doubt.

In tropical Africa other causes of optic neuritis and optic atrophy must be taken into account. These are onchocerciasis, syphilis, ankylostomiasis, nutritional diseases and, most important of all, intoxication from pentavalent arsenical preparations, used in treatment.

Other more serious retro-bulbar lesions have been noted in cases of trypanosomiasis, such as arachnoiditis producing varied and often atypical changes in the field of vision and in the colour of the optic discs ; more rare lesions such as paralysis of the facial nerve and changes in the pupillary reflexes have occasionally been reported.

American trypanosomiasis of Chagas's disease presents signs quite different from the trypanosomiasis due to *T. gambiense* and *T. rhodesiense*. The conjunctiva is often the seat of inoculation owing to the deposit of the infective excreta of the different Reduviid bugs producing follicular conjunctivitis, adenitis of the lachrymal gland, and unilateral oedema of the upper and lower eyelids, the oedema is hard and usually not painful. This constitutes Romaña's sign which is typical of the disease.

Finally, the author discusses the general treatment of ocular complication of trypanosomiasis with pentavalent arsenical preparations, pentamidine and Arsobal [Mel B]. He points out if pentamidine is used in the early stage of the disease and Arsobal in the later stages, the disease can be satisfactorily cured, and the danger of arsenical optic neuritis from the pentavalent arsenical preparations can be avoided. *E. O'G. Kirwan*

PROTOZOOLOGY : GENERAL

GARNHAM, P. C. C. **The Liver in relation to Protozoal Infections.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, May, v. 43, No. 6, 649–58, 1 diagram. [19 refs.]

The liver, as an organ in which certain protozoa undergo part of their development, has acquired particular significance since the recent discovery of the exoerythrocytic stages of the human malaria parasites, in which the author has taken a prominent part. In the present paper he takes the opportunity to pass in review and discuss the relation of other Sporozoa to the liver. After recalling some histological data regarding this organ, he notes that its richness in nutritive matter provides the protozoa with a very favourable environment. One of these organisms, the rabbit coccidium *Eimeria stiedae*, develops in the epithelium of the bile ducts which become hypertrophied, forming tumours, which occupy much of the liver substance and eventually cause the death of the host. The host-parasite relations of other parasites are more harmonious. Thus, the haemogregarine of the rat (*Hepatozoon*) undergoes its asexual development in the parenchymatous cells of the liver without causing it any damage, while among the Haemosporodia some species of *Haemoproteus* develop in the endothelial cells of the liver capillaries in birds, and may block their lumen. The malaria parasite of fowls, *Plasmodium gallinaceum*, undergoes exoerythrocytic schizogony in the Kupffer cells lining the sinusoids. [The reviewer has previously (1932) shown that a *Hepatozoon* of crocodiles undergoes schizogony in these cells.] In a malaria parasite of Palestine bats the EE stages occur in the undifferentiated endothelial cells of the sinusoids.

Clues to the EE development of the human malaria parasites were provided by two other Haemosporidia. In one, *Leucocytozoon* of birds, schizonts reaching an enormous size are produced inside the parenchyma cells or in histiocytes. In the other, *Hepatocystes* (formerly *Plasmodium*), species of which are parasitic in African monkeys and in Asiatic squirrels, a similar type of schizogony is restricted to the parenchyma cells of the liver. Finally, the author turns to the EE development of the human and a simian malaria parasites (*P. vivax*, *P. falciparum*, *P. cynomolgi*) which also takes place in the parenchyma cells of the liver. He recounts the history of the discovery of and describes these stages. He also considers the unknown earliest stages of development of the sporozoites during the first four days after their inoculation into the human body, and is inclined to accept the view that their initial development takes place in the reticulo-endothelial cells of the liver.

The author emphasizes the absence of any reaction on the part of the liver to the blood-inhabiting Sporozoa, as compared with the extensive lesions produced in this organ by *Entamoeba histolytica*. [However, one naturally expects the host-parasite relations to be harmonious in the case of parasites undergoing their *normal* life-cycle in the liver, but not in the case of a *metastatic* invasion of this organ by a parasite normally inhabiting the intestine.]

C. A. Hoare

PIEKARSKI, G. Zur Epidemiologie der Toxoplasmose. Kurze Mitteilung. **Epidemiology of Toxoplasmosis.** *Ztschr. f. Parasitenk.* 1949, Dec. 31, v. 14, No. 4, 388–9.

The author has demonstrated that the blood of mice and rabbits suffering from toxoplasmosis, when inoculated into mice, produced in them a fatal infection, with parasites in the peritoneal exudate. Having satisfied himself that at a certain period of the infection (in mice on the 3rd day) the parasites could be

found in the peripheral circulation, the author undertook a series of experiments to test the possible rôle of blood-sucking insects in the transmission of toxoplasmosis, using fleas (*Ctenopsyllus segnis*), bed-bugs (*Cimex lectularius*) and triatomid bugs (*Rhodnius*). The insects were allowed to feed on infected mice and rabbits, for various periods of time, after which they were killed and the emulsion of teased-up insects was inoculated intraperitoneally into mice. This invariably resulted in a fatal infection, with numerous toxoplasms in the peritoneal exudate. It is thought that the transmission of toxoplasmosis by blood-sucking insects may occur under natural conditions, and is effected *per os*, when the rodents devour the insects. *C. A. Hoare*

Westphal, A. Das Vorkommen von Toxoplasmose in Deutschland und ihre Behandlungsmöglichkeit mit Aureomycin. [**Occurrence of Toxoplasmosis in Germany, and its Treatment with Aureomycin.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Apr., v. 1, No. 4, 526–32. [10 refs.]

The author reports the results of an examination of 400 persons in the Hamburg district for evidence of toxoplasmosis, by means of Sabin and Feldman's dye test [*Science*, 1948, Dec. 10, 660]. They were represented by three groups. The first comprised 50 healthy persons, 100 women after normal childbirth and 103 hospital patients suffering from various complaints. Among these 253 persons none showed any symptoms of toxoplasmosis, but in 4 cases of the second category, and in 3 of the third the reaction was positive ; 5 reactions at a titre of 1 : 25 were doubtful, but in 2 the titres were 1 : 50 and 1 : 400 respectively. The second group contained 134 persons in whom there were clinical signs suggestive of toxoplasmosis, *e.g.*, children with encephalitis and their parents, ophthalmological and neurological cases. Among these cases, 25 (18·6 per cent.) showed positive reactions at titres 1 : 50–1 : 400. The third group comprised 13 stillborn infants and 8 malformed foetuses. The reaction was positive in 10 of the former and in 3 of the latter. From these figures it is concluded that toxoplasmosis must be common in Germany, the incidence for the Hamburg district being estimated at 2 per cent. of the population, which corresponds to the proportion of stillborn babies. Toxoplasmosis would therefore appear to be an important cause of prenatal death.

The author then turns to the effect of aureomycin on toxoplasmosis. Experiments with this antibiotic were prompted by an accidental observation that aureomycin lowered the serological titre. In 2 cases of laboratory infection with constant titres of 1 : 50 and 1 : 800, administration of aureomycin resulted in negative reactions 2–3 weeks later. The course of treatment was 2 capsules (250 mgm. each) of aureomycin given 4 times daily for 3 days (total 24 capsules), in one case, and 16 capsules in 24 hours, in the other. These observations suggest that latent visceral toxoplasmosis is amenable to treatment. [In the English summary to this paper the term "miscarried fetuses" is a misprint for "malformed fetuses".] *C. A. Hoare*

ENTOMOLOGY AND INSECTICIDES : GENERAL

Freeman, P. **The External Genitalia of Male Simuliidae.** *Ann. Trop. Med. & Parasit.* 1950, July, v. 44, No. 2, 146–52, 9 figs. [15 refs.]

Wygodzinsky, P. Contribuciones al conocimiento de los Simuliidae argentinos. III. *Simulium dinellii* (Joan, 1912) y *Simulium wolffhügeli* (Enderlein, 1922). [**A Note on Argentine Simuliidae III.** *Simulium dinellii* **and** *S. wolffhügeli*.] *An. Inst. Med. Regional.* Tucuman, Argentina. 1950, May, v. 3, No. 1, 75–97, 110 figs. English summary.

JORDAN, K. **Notes on a Collection of Fleas from Peru.** *Bull. World Health Organization.* Geneva. 1950, v. 2, No. 4, 597–609, 5 figs.

BOUVIER, G. Ensaio de tratamento do bicho-do-pé. [**Treatment of Chigger Infection.**] *Publicações Médicas.* São Paulo. 1950, Feb., v. 20, No. 175, 15–17, 3 figs. (1 coloured on pl.).

The author has found the local application of Gammexane ointment very efficacious in getting rid of *Tunga penetrans*. When it burrows into the skin the " posterior respiratory stigmata " are still exposed and the ointment causes at first active movement, followed by death in less than 24 hours. Often the insect will detach itself, but if it does not it is easily removed and the wound does not suppurate. The preparation used was that known as Bichocid, made by the Rhodia Firm, Brazil. *H. Harold Scott*

GORIROSSI, Flora E. **The Mouth Parts of the Adult Female Tropical Rat Mite, *Bdellonyssus bacoti* (Hirst, 1913) Fonseca, 1941 [= *Liponissus bacoti* (Hirst)], with Observations on the Feeding Mechanism.** *J. Parasitology.* 1950, Aug., v. 36, No. 4, 301–18, 34 figs. on 4 pls.

KOHLS, G. M. **Ticks (Ixodoidea) of the Philippines.** *Nat. Inst. Health Bull. No. 192.* Wash. 1950, 28 pp., 7 figs. [31 refs.]

MERCADO, Teresa I. **Observations on the Respiration of Triatomes.** *Puerto Rico J. Pub. Health & Trop. Med.* 1950, June, v. 25, No. 4, 428–43, 2 figs. [Refs. in footnotes.] [Spanish version 444–59.]

BALAZUC, J. Un fenomeno de anafilaxia producido por picaduras de *Triatoma* (*Hemiptera, Reduviidae*). [**Anaphylactic Phenomena following Bites by Triatoma.**] *An. Inst. Med. Regional.* Tucuman, Argentina. 1950, May, v. 3, No. 1, 35–7. French summary.

In February, 1949, the author was given some ova of *Triatoma infestans* and *Rhodnius prolixus*. When they bred out he used to feed the insects on his own forearms. At first the bites of the Triatoma were quite harmless, but a week or so after the bite an itching papule formed and rubbing converted this into a vesicle which later dried with a scab. After 5 months, the results of the feeding were more severe. Half an hour after the bite there was marked pruritus, at first local, then more general on hands, neck and chest, with conjunctival injection, oedema of the face and urticaria of the trunk, tachycardia and general depression. These symptoms passed off in an hour or two. After six months these anaphylactic symptoms no longer appeared even when as many as 50 were allowed to feed in an hour.

In a note Professor Romaña states that in places where these insects abound one commonly sees local reaction to their bite, but such general anaphylactic signs as those described have not previously been noted. *H. Harold Scott*

SYMMERS, W. St. C. & VALTERIS, K. **Two Cases of Human Infestation by Larvae of *Linguatula serrata*.** *J. Clin. Path.* 1950, Aug., v. 3, No. 3, 212–19, 5 figs. [12 refs.]

" Two cases of human infestation by the larval form of *Linguatula serrata*, one of the so-called tongue-worms, are described.

" In one patient the infestation, diagnosed by identifying the larva in a portion of liver removed during cholecystectomy, may have played some part in causing her symptoms. In this case treatment with neoarsphenamine was

given without conclusive effect. The second case was discovered incidentally at necropsy, and accords with the usually accepted view that *Linguatula serrata* is not of practical importance in human pathology."

HAYES, W. J., Jr. & SIMMONS, S. W. **Benefits and Hazards of Insecticides to Public Health.** Reprinted from *Advances in Chem. Series.* 1950, No. 1, 56–60. [33 refs.]

A brief account of general trends.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

JONES, S. A. **The Mobile Medical Unit in Colonial Work.** *J. Trop. Med. & Hyg.* 1950, Feb. & Mar., v. 53, Nos. 2 & 3, 23–33 ; 58–66, 9 figs. & 1 map. [15 refs.]

Although a small part of this paper consists of a review of the mobile medical units used in various British Colonies, the main part is a description of the unit which operated in Transjordan under the control of the author from April 1937 onwards. The account is illustrated by a map and a number of photographs. The country is that of Lawrence's exploits, and the people are members of the tribes he knew. They are mostly nomadic, though some cultivation is carried out, and, of course, there are townsmen in Amman, Ma'an and other places.

The account is most interesting, but details of the organization of the travelling dispensaries cannot satisfactorily be abstracted, and should be sought in the original. The staff originally consisted of the author, with 4 Arab medical orderlies trained in the treatment of common diseases, and specially chosen and paid for the work, and one Circassian driver. The wives of the orderlies accompanied them. Tents were much used for the moveable dispensaries, and there was one dispensary car fitted as a laboratory. The three tent dispensaries were sited in different tribal areas, and moved as required, especially in times of epidemics, and the author made frequent visits to all of them. As time went on he attempted to use permanent buildings instead of tents, which are troublesome. Communications between the dispensaries and himself were fairly easy because the organization of the Arab Legion, with its scattered outposts in telegraphic communication, was at the disposal of the unit. The life was obviously strenuous, because the people made much use of the unit ; the author writes with evident admiration of the work of his Arab assistants.

In 1941 he became senior medical officer of the Arab Legion, and after 1942 he could no longer conduct the clinics for the civilian Arabs.

The conditions with which the unit had to deal include malaria (in Azraq only), louse infestation, flies, tuberculosis, rabies (in dogs), syphilis (usually *bejel*, non-venereal in type, there was little gonorrhoea), smallpox (one case, but this led to a widespread programme of vaccination), and trachoma (very common). The water supply of this country was very difficult and although no indigenous schistosomiasis was seen, schistosome dermatitis occurred. Leeches were present in some waters. Dysentery was fairly common, but was mainly bacillary in type.

The Arab women are prolific, but although a total of 15 children per woman was not uncommon, it was seldom that more than 4 or 5 survived to adult life. Pneumonia and gastro-enteritis were probably the common causes of child and infant deaths, yet the author did not see many cases. This may have been because during the years when the unit was operating, the economic

situation was good, with adequate rain and increase of live-stock, so that nutrition was satisfactory. In famine years the mortality is high, and in the past these lean years have served to maintain the population at a fairly stationary level. Failure of rain leads to starvation, epidemics and tribal raids for food.

The author makes an important point when he states that for the treatment of the common diseases the powerful specific remedies should be used rather than cheaper but less effective drugs, especially in field work where long courses cannot be given. These specific drugs should form the bulk of the stores. It is always essential to carry a set of dental instruments.

This is an important paper, which deserves study by all who are organizing travelling medical services for primitive people.] *Charles Wilcocks*

VAN RIEL, J. Conceptions actuelles de l'hygiène tropicale. **Modern Conceptions of Tropical Hygiene.** *Bruxelles-Méd.* 1950, Apr. 9, v. 30, No. 15, 781–92.

Tropical medicine has passed through two stages, the direct effects of climate being considered all-important in the first and of no significance in the second, where parasitic or other infection was the sole cause of disease. It is now passing into a third where the influence of climate is again considered important, though it probably acts by facilitating the means of transmission, as by droplets or insect vectors, rather than by direct action on the host or organism. Disease is ultimately due to environment which has sanitary, entomological, economic and climatic components.

Tropical hygiene is therefore the care of that particular type of environment characteristically populated by backward and depressed people, whose primitive state is not due to racial characteristics but to their having escaped historical and geographical movements.

The methods of tropical hygiene must include the treatment of cases for their own sake, but primarily to limit their infectivity ; the improvement of sanitation ; the control of insects and economic and cultural advancement. Examples of each are given. They include treatment of trypanosomiasis, the prophylaxis of malaria by drugs, vaccination against dysentery, vaccination, and the wide use of DDT and benzene hexachloride. The most important step in the Belgian Congo is the formation of the *Fonds du Bien-Etre*, which appear to be analogous to Colonial Development and Welfare Funds. The annual resources will exceed 250 million francs (at current rates 140 Belgian francs equal £1). Some of these funds will be spent on such matters as soil conservation, improvement of agricultural methods, mechanization of agriculture, transport and public works. The greater part of them will, however, be spent on medical and social objectives ; hospitals, sanatoria and medical services, campaigns against the decreasing birth rate in parts of the Congo, and against the major endemic diseases. *G. Macdonald*

BIVENS, M. D. **Medical Education in the Western Pacific.** *Amer. J. Trop. Med.* 1949, Nov., v. 29, No. 6, 845–57.

This is a general account of the curriculum and organization of the medical school founded by the U.S. Navy Department on the Island of Guam since the war. The students are drawn from educated young men from Guam, Samoa, the Marshall Islands and other Pacific islands, and the object is to train them to the extent of one for each 800 people. Eighty-one students have been enrolled,

including 19 dental students. The course comprises 6 months of pre-school training (English, geography, mathematics), and 8 semesters (each of 6 months), of which one is devoted to English, history, mathematics and political science ; the rest cover biology, the basic sciences, and the medical subjects. Students who graduate will do one year's work as internes before assuming full duty.

The author gives considerable detail of the courses, and refers to the work of the medical school at Suva, Fiji, which was studied with profit when plans for the present work were being made. *Charles Wilcocks*

PINOTTI, M. Endemias tropicais e sua repercussão no provoamento. [**Tropical Diseases and their Demographic Implications.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1949, Oct., v. 1, No. 4, Suppl. 365–90.

D'IGNAZIO, C. & MIRA, M. G. Ricerche epidemiologiche in alcuni territori di Etiopia. [**Epidemiological Research in certain Parts of Abyssinia.**] *Arch. Ital. Sci. Med. Colon. e Parassit.* 1949, Aug., v. 30, Nos. 7/8, 97–141, 1 fig.

The investigations described were part of a large programme of epidemiological research undertaken by a technical mission of the U.S.A. in agreement with the Government of Abyssinia. Three more or less isolated small villages were selected, each representative of a climatological division of the country : Ambo, on the Dessie-Gondar track, at a high altitude and with a cool temperature ; Sciabe, between the forestal areas of Beletta and Caffa, of medium altitude and with a damp climate ; Gauani, in Dancalia, low-lying and with a hot climate. In each village a thorough clinical and pathological examination was made of its inhabitants and the environmental conditions concerned with disease transmission were studied.

In Ambo only one of 206 inhabitants had an enlarged spleen. Six of them harboured malaria parasites, 4 *P. falciparum*, 1 *P. vivax*, and 1 both parasites. The only two *Anopheles* found were *A. cinereus* and *A. garnhami*. The village appears to be exempt from locally acquired malaria. (On journeys to or from Ambo anophelines identified included *A. dancalicus*, on the Dessie-Assab road ; *A. rhodesiensis*, in a highly malarious locality in Dancalia where it appeared to be the only anopheline present, and a new variety of *A. macmahoni* for which the author proposes the name *barkühusi*. In the Borchenna valley *A. gambiae*, *A. pharoensis* and *A. coustani* were taken : the last named is believed to play an important rôle in malaria transmission in parts of this country.) No spirochaetes of relapsing fever were found in the 206 thick blood smears examined in Ambo.

The Kahn reaction was positive in 117 of 189 sera examined. The percentage of positive reactions increases with age ; over the age of 50 it was 76·9 per cent. This widespread prevalence of syphilis in a village remote from important routes of communication is serious and somewhat unexpected. Fevers of the typhoid group appear to be rare ; of the 189 sera examined for the Widal reaction at a titre of 1 in 100, none was positive to *Salm. typhi*, 2 to *Salm. paratyphi* A, and 1 to *Salm. paratyphi* B.

The Weil-Felix reaction in these 189 sera was positive in 19 with antigen *Proteus OX19* in dilution 1 : 320, and in 2 with antigen *OXK* in same dilution. The only rodents that come into contact with the human population of Ambo are *Desmomys* [*Pelomys*] *harringtoni*, *Neantomys giaquintoi* Toschi [a new species] and *Mastomys* [*Rattus*] *coucha lateralis*. One each of the last two named gave a positive Weil-Felix reaction with antigen *OXK*. No *Rattus rattus* was found in Ambo, and no *Xenopsylla cheopis*.

One of 99 sera gave a positive agglutination with *Brucella melitensis*, 1 in 25 dilution.

Intestinal parasites were looked for in 103 faecal samples : parasites and the number of cases in which found were as follows : *Entamoeba histolytica* 22, *E. coli* 46, *Iodamoeba bütschlii* 4, *Endolimax nana* 1, *Giardia intestinalis* 1, *Taenia saginata* 7, *Ascaris lumbricoides* 3.

There was no evidence of tuberculosis, leishmaniasis or leprosy. The gonococcus was found in 5 cases. No ticks were found on sheep or cattle in Ambo.

In Sciabe, at a medium altitude and with a damp climate, the blood of 229 persons was examined : *P. falciparum* was found in 14, *P. vivax* in 12, parasite index 11·35 per cent. All the infected persons had visited neighbouring malarious areas. No anophelines were found in Sciabe at the time of the visit. None of the blood smears contained spirochaetes.

Of 211 samples of serum 177 gave a positive Kahn reaction. This very high incidence of syphilis may be in part due to the fact that the village is near an important road and is a market place of some local importance. There was little evidence of diseases of the typhoid group : 4 of 208 sera gave positive reactions with paratyphoid A, in dilution of from 1 : 50 to 1 : 100. Positive reaction with dilution below 1 : 50 were typhoid 32, paratyphoid A 47, paratyphoid B 9.

The Weil-Felix reaction was determined in 208 sera : positive reactions were as follows : at a titre of 1 : 320, 3 with antigen *OX19*, 5 with antigen *OXK* ; at a titre of 1 : 160, *OX19* 13, *OXK* 7 ; at lower titres *OX19* 54, *OXK* 31. Further investigation is necessary to determine the nature of the rickettsia infections of which these results are evidence. Ticks collected on domestic and wild animals in Sciabe include *Amblyomma variegatum*, *Amblyomma gemma*, *Haemaphysalis leachi*, *Rhipicephalus pulchellus*, *R. simus* and *R. evertsi*.

Two of the sera agglutinated *Brucella melitensis* and 4 *Br. abortus*.

The incidence of intestinal parasites in 207 faecal samples examined was : *Entamoeba histolytica* 15, *E. coli* 26, *Iodamoeba bütschlii* 2, *Chilomastix mensnili* 1, *Ancylostoma duodenale* 55, *Ascaris lumbricoides* 102, *Trichuris trichiura* 25, *Strongyloides stercoralis* 3, *Enterobius vermicularis* 2 and *Taenia saginata* 1. Only one of the hookworm cases had serious clinical symptoms.

Biospy of the skin of 228 inhabitants of Sciabe revealed the presence of onchocerciasis in 13. Tubercle bacilli were found in the sputa of 5 of 7 individuals presenting symptoms suggestive of pulmonary tuberculosis.

In the village of Gauani in southern Dancalia, low-lying and hot, thick blood smears from 167 inhabitants were examined : *P. falciparum* was found in 33, *P. vivax* 21, parasite index 35·5 per cent. The splenic index was 73·21 per cent. These examinations were made in the dry season when malaria transmission is least active. *Anopheles gambiae* and *A. pharoensis* were then the only two species found. No relapsing fever spirochaetes were found in the smears.

A positive Kahn reaction was obtained with 59 of 116 samples of serum examined. Widal reactions showed that fevers of the typhoid group were even rarer than in the other two villages. One serum gave a positive Weil-Felix reaction with antigen *OX19* at a titre of 1 : 320, and one with antigen *OX2* at the same dilution. Twelve of 115 sera agglutinated *Brucella melitensis* and seven *Br. abortus*. *Norman White*

TUCKMAN, E. **Rural Health Problems in China.** *Lancet.* 1950, Mar. 18, 508–10.

The author served with a Friends' Service Unit in China. He remarks that in the whole of China fewer than 20,000 medical students have graduated, and that the number of hospital beds is less than 40,000. In the rural areas, where over

85 per cent. of the 475,000,000 people live, medical services have been virtually non-existent. The doctors are mostly in the towns.

In the villages of Honan, where society (at the time of the author's relief work in 1947) was feudal, with big landlords and illiterate peasants who were the prey of bandits and corrupt officials, sanitation did not exist and the only medical services available were those of the local herbists. The crude mortality rate was estimated at 25–30 per 1,000, the infant mortality at 200 (or probably more) per 1,000 live births, and the maternal mortality at 15–20.

The common killing diseases are gastro-intestinal diseases, pulmonary tuberculosis, smallpox, diphtheria, kala azar (in the north), schistosomiasis (in the centre) and malaria (in the south), cholera, enteric, typhus and plague. Other very widespread diseases include trachoma (affecting over one-third of the population), venereal diseases (nearly one-tenth), helminth infestation (widespread), leprosy (over one million), and food deficiencies.

This is the picture drawn by the author of the old China, under the rule of the Kuomintang. In 1948 he went into one of the areas taken over by the communists, and there he found that both military and economic conditions were stable ; beggars and bandits had disappeared, landlordism had been abolished but there was no collectivization, the land being held and worked by peasant owners. Food production had increased by nearly 10 per cent. over the previous year. Taxes were about 23 per cent. of the main crop in 1949 (against about 70 per cent. in Honan in 1947) and corruption was unknown in the local officials. The author's team was invited to deal with an epidemic of 20,000 cases of kala azar, about 3 per cent. of the population. The treatment given converted a 95 per cent. mortality to a 90 per cent. cure-rate. Much other medical work, of course, was done.

The author describes the efforts of the government authorities to cope with the outbreaks of plague, cholera and typhoid, and to develop rural health services, in part of the country as big as England, with a population of 64 millions. There is a plan to set up one hospital in each of the hundred *hsiens* into which the area is divided, and this was accomplished, though to do so it was necessary to use temples, the homes of absentee landlords, or even adapted mud houses. Equipment was, of course, elementary.

Part of the staff of the new hospitals came from graduates of the North China Medical College, in which there were 1,000 students whose training lasted 3½ years. When university towns were captured, the longer and more traditional courses were continued, but the shorter course was considered necessary in face of the urgent need for men and women with at least some medical training. The old-style feudal doctors of the countryside have been supported, because it was found that they readily absorbed modern medical knowledge.

[The author has obviously been impressed by the spirit shown by the communists in the area now under their control, and contrasts it very favourably with the spirit of the Kuomintang régime which it displaced.]

Charles Wilcocks

CEYLON : PLANTERS' ASSOCIATION ESTATES' HEALTH SCHEME. **Report and Accounts for the Year ended 31st July, 1949.** 36 pp., 7 figs. & 1 graph.

The Report recounts the history of the Scheme which was started by an invitation to Sir Ronald Ross to visit Ceylon Estates in 1925. Until 1949 it was known as a Malaria Control Scheme but it is now enlarged into a general Health Scheme, to which estates covering 487,931 acres (74 per cent. of the membership of the Planters' Association) subscribe.

The principal vital statistics and morbidity figures for subscribing estates in 1948 are given below ; where comparable figures for 1945 are available they are quoted in brackets.

	Estates over 3,000 ft. elevation	Estates under 3,000 ft. elevation
Population	51,907	294,139
Live birth rate per 1,000	47·4 (42·1)	44·9 (41·2)
Death rate per 1,000	13·0 (14·3)	10·5 (14.8)
Infant mortality rate	118·9 (126·9)	88·5 (107·8)
Malaria, cases per 1,000 per annum ...	—	48·4 (397·1)

All Estates

No. of cases of illness (all causes) per 1,000 per annum...	2,313
Working days lost through sickness or attendance on sick relatives, per worker per annum	9·2

As a result of malaria control measures initiated on estates independently of the Government scheme, but now fully co-ordinated with the latter, malaria in 1948 accounted for only 1·9 per cent. of the cases treated and 3·6 per cent. of the time lost. Further improvement was being achieved in the first six months of 1949.

Anaemia and malnutrition remain as important problems affecting large proportions of the population. Conjunctivitis affected 5·2 per cent. [8·2 in a table] of the population in 1948 and was responsible for more sickness than malaria ; it is believed that *Siphunculina funicola* may be responsible for its transmission.

Work carried out, in addition to much malaria control by residual insecticides, included helminth surveys, the giving of technical advice on sewage systems adapted to estate needs, research into the breeding habits of *Siphunculina funicola*, enquiries into the bionomics of *Lasiohelia stimulans* and *Forcipomyia* spp. which are great nuisances, and clinical trials of proguanil as a prophylactic drug.

In conclusion it is stated that the vital statistics of Ceylon Estates compare favourably with those of Ceylon as a whole and of labour forces elsewhere in the tropics. The measures most required for further improvement are a better standard of nutrition and better sewage disposal. *G. Macdonald*

Gorgas Memorial Institute. **Annual Report of the Gorgas Memorial Laboratory, 1949** [Siler, J. F., President]. 40 pp.

The Laboratory has carried out a varied programme of work with particular reference to five subjects : sylvan yellow fever, Q fever, tuberculosis surveys and BCG vaccination, medical entomology, and the control of malaria by DDT and drugs. Most of the work has been or will be published separately but the Report gives a good outline of methods and progress.

An outbreak of sylvan yellow fever in the neighbourhood led to particular concentration on the subject, to some extent to the detriment of others. Out of 116 animals examined, 41 gave a positive mouse protection test ; 38 of these were monkeys, and 3 kinkajou [a carnivorous quadruped]. Studies of forest mosquitoes from tree platforms showed the presence of the following species : *Haemagogus lucifer*, *Sabethoides chloropterus*, *Haemagogus equinus*, *H. spegazzinii falco*, and *Aëdes leucocelaenus*. Work on their rôle in transmission is as yet inconclusive but continues [see also Courtney, above,

p. 1078]. Studies on Q fever had to be terminated after the demonstration that *Amblyomma cajennense*, infected in the larval stage from a guineapig, readily transmitted the disease in the nymphal and adult stages.

Tuberculosis is said to be increasing in Panama. A BCG vaccination service was established and is at present working on a small scale, using vaccine imported from Cuba. The results of preliminary tuberculin tests are tabulated in detail by age and degree of reaction with first and second doses of PPD. The total percentages positive in four rural areas were 52·7, 68·6, 52·9 and 59·3. The results of vaccination as measured by the tuberculin test were slightly disappointing, and the period of storage of the vaccine, at room temperature before use is considered to be possibly responsible. Positive reactors to the initial test in three towns were examined in a mobile X ray unit, and 2·7, 4·1 and 7·4 per cent. were found to show active lesions.

Doctors Hertig and Fairchild continued their studies on *Phlebotomus* from Panama, the West Indies and the Mediterranean region. Contrary to previous belief the genus has been found to be widely distributed in the Lesser Antilles, but there is some doubt whether these sandflies bite man. Taxonomic studies continue, a new genus (*Hertigia*) has been described, and an improved method of mounting and examination developed.

Malaria control is experimentally practised by various combinations of DDT treatments and drugs. The parasite rates are now so low in all the treated areas (2·2 per cent. and 3·9 per cent. in DDT areas, 1·7 per cent. and 3 per cent. in chloroquine and paludrine groups) that comparison between them is difficult. [On p. 33 it is stated that the parasite rate in Chagres river was 2·2 per cent., on p. 34 that the rates in adults and children respectively in this area were 6·1 per cent. and 9·2 per cent.—clarification is needed.]

The Report is well presented and gives a useful summary of an ambitious and successful year's work, which avoids the fault of excessive condensation. It includes a bibliography of published work which together with the summary makes it useful for reference. *G. Macdonald*

Pearse, A. S. [Edited by]. **Zoological Names. A List of Phyla, Classes, and Orders.** Prepared for Section F American Association for the Advancement of Science. 4th Edition. 24 pp. 1949. Durham, North Carolina.

The fourth edition of this list incorporates some changes made at the suggestion of several scientists, but in the main is similar to the third edition [see this *Bulletin*, 1948, v. 45, 216, 1131]. *Charles Wilcocks*

BOOK REVIEWS

Manson's Tropical Diseases. A Manual of the Diseases of Warm Climates. Edited by Sir Philip H. Manson-Bahr, C.M.G., D.S.O., M.A., M.D., D.T.M. & H. Cantab., F.R.C.P. London, etc. Thirteenth Edition. pp. xiv + 1136, 17 colour pls., 9 half-tone pls., 412 text figs., 8 maps & 29 charts. 1950. London, Toronto, Melbourne, Sydney & Wellington : Cassell & Co., Ltd. [45*s*.]

A work which has to be issued biennially needs no other voucher for its popularity, and such a popularity among a deep-thinking and critical community vouches also for the accuracy and usefulness of the information it imparts. A book which has reached its 13th edition does not call for a review

as detailed as would a new production, but it does demand that attention be drawn to the changes which an indefatigable editor has seen fit to make.

After the spate of records which resulted from the experiences of many men working in the tropics for the first time, under the stress of war conditions, the production of information is settling down to a more normal rate of flow. Nonetheless, remarkable advances have been made during the past two years which have resulted in our having to modify some of our previous conceptions and also in adding considerably to our knowledge of disease in warm climates.

To take account of all this and hold fast that which is good and incorporate it into work already firmly established on the old foundations must have been a very great task and would appal any but the most zealous and energetic editor of Manson's Tropical Diseases. Good as was the 12th edition of 1948, this new one, published only 21 months later, is vastly better. When one sees that the new edition has embodied all the recent work and yet is only 66 pages longer than its immediate predecessor, it is obvious that the revision, which one may say at once is very complete, has led to judicious discarding of outworn ideas to make place for new discoveries. Before we consider any matters of detail let us say that this 13th edition contains 6 more text figures, two more maps and one more chart; that the whole has been printed on better paper and that, whereas as a rule the pictorial reproductions become less and less clear in successive editions owing to wear of the blocks, the illustrations in this edition are almost without exception more clear and more sharply defined than in the 12th edition. New fundamental work on the story of malaria of the utmost importance has been carried out during the past two years, new synthetic drugs have been tried, especially for the treatment of malaria and trypanosomiasis; great strides have been made in our knowledge and experience of the uses of antibiotics—penicillin for yaws, relapsing fever and tropical ulcers; streptomycin in plague and tularaemia; chloromycetin (chloramphenicol) in typhus fevers, to quote but examples—and the further application of insecticides. In short, revision has been most thorough; every section and subsection, nay, almost every paragraph, bears evidence of fresh care and thought, and many parts which could not be satisfactorily revised have been rewritten. Maps showing the geographical distribution of certain diseases have been redrawn; the section dealing with Climatology has been omitted to make way for newer developments and fresh knowledge. The introductory section, formerly designated *Life in the Tropics*, in two chapters, now comprises three chapters dealing in turn with Preparations for Residence in the Tropics; Life in the Tropics and general diseases which occur there, that is, diseases common to tropical and non-tropical climates; and, lastly, the Tropical Anaemias, formerly included as part of Life in the Tropics. This new arrangement is vastly better. Colorado Tick fever and Bullis fever have been removed from the section dealing with the typhus group of fevers and placed in that on viral diseases. Rhinoscleroma and tropical eosinophilia are additions in the section on Local Diseases. Section XI, formerly designated Technique, is now headed Special Subjects and has been entirely recast to include new chapters on penicillin and on DDT and their uses. In the Appendix several changes have been made, especially in Section B, formerly named Laboratory Methods, now Clinical Pathology. A subsection on an all-important subject, particularly in the tropics, the care of microscopes and glassware, has been inserted. Several subsections in the previous edition have been omitted: Biochemical examination of urine and blood, including tests for quinine, atebrin, urobilin, etc., was, it is true, too important to be disposed of in a couple of pages; special staining methods, again, formed too large a subject for inclusion in a general text-book; agglutination methods and practice are not now usually carried out by a tropical general practitioner, nor

is the preparation of special culture media. All these have been left out—in our opinion wisely. Others, however, we can less afford to lose and think it is a pity that these have been dropped. Of these, the methods of preserving helminths and their eggs and the tables of scales and standards are notable. Many practitioners in the tropics come across worms and ova which they find difficulty in identifying. The reviewer, 30–40 years ago, found himself in such a position and used to send home to the Tropical School specimens for diagnosis and for his enlightenment and obtained incomparable and invaluable help from Professor Leiper. The omission of this subsection, we repeat, will be a great loss. The importance of scales and standards needs no emphasis and no reason is given in the preface for their omission. The Pinta plate of the last edition has been left out, but this is more than compensated by an excellent radiogram of *Ascaris* in the intestine which now appears. As for the maps, the old outline map of the geographical distribution of trypanosomiasis, African and American, is replaced by a better one of the distribution of the African form and one showing the distribution of American trypanosomiasis is a new addition and very useful ; it will probably need revision as fresh foci of infection are brought to light. Again, the old small line-map of the geographical distribution of yellow fever in Africa and America has been replaced by better and larger separate maps of the disease as seen in Africa and in South America. Another addition is a map of the world distribution of tropical sprue—very important in view of the many reports of the existence of this disease since the end of the World War II.

So much as regards more general changes. Attention should next be drawn to matters of detail. The chapter on Fitness for Tropical Service could not be bettered ; it is based fundamentally on common sense and wide experience. The account of " low fever " is good and a better name for it, until some definite cause is found, is that suggested—Climatic fever. That part of Chapter II which discusses " general diseases " is a very good summary of their chief features and quite adequate for all general purposes and is certainly an improvement on the former inclusion of these in " Life in the Tropics." Many names and opinions are quoted in this (and incidentally in other sections) but no references to the literature are given for verification and fuller reading. In the 12th edition there was a section on Passing Patients for Fitness to return to the Tropics after Leave ; the omission of this is, we think, a pity, but perhaps is justified in that this work is carried out by specialists at home and so hardly comes within the duties of the practitioner abroad.

The whole arrangement of the malaria chapter has been reconsidered and, in the reviewer's opinion, much improved thereby and it is in consequence, if we may apply the term, more sequential. For example, the pathology of blackwater fever now comes under the section dealing with blackwater fever and not as an adjunct to the pathology of malaria. Also the mechanism of the haemolysis and of the anuria in this disease has been rewritten and brought up-to-date. The drug treatment of malaria has been thoroughly revised, newer drugs discussed and their method of use fully described. Therapeutic malaria now comes at the end of the chapter instead of being inserted between transmission and morbid anatomy—certainly an improvement.

In the trypanosomiasis chapter (Chapter V) there is, as already mentioned, a better map of the distribution of the disease in Africa and a detailed account of the districts in which the infection prevails. Presumably to save paper, the plate showing Leishman-Donovan bodies in kala azar is still placed in the human trypanosomiasis chapter, but plates IV and V have been transposed so that Terzi's beautiful pictures of tsetse flies precede the kala azar plate which faces photomicrographs of the brain in sleeping sickness. In the leishmaniasis chapter a new picture of espundia of the face, of fearsome reality, replaces

that of the benignant and resigned-looking old man of the previous issue. In addition there is a very realistic photograph of the punched-out ulcers of dermal leishmaniasis.

In chapter VIII, the penicillin treatment of Weil's disease is a fresh addition. Chapter IX on Rat-bite fever is improved by a fuller account of Haverhill fever and a table comparing and contrasting the two. Chapter X contains a better picture of the miliary form of verruga peruana. Chapter XI contains a new table of the features of Rickettsial infections and fevers of the typhus group and the part dealing with the treatment of epidemic typhus is much amplified. Q fever was, it is true, first noted in Queensland and many are inclined to think that the Q stands for Queensland, whereas, as a matter of fact, it stands for Query. Perhaps mention might be made of this before it is too late to prevent the repetition by foreign writers of "Queensland fever" which we often see and which of late has been gaining ground. This becomes more and more important now that the disease has been reported from America and in Europe in Greece, Italy, France, Corsica, Switzerland and elsewhere. We all remember what a long time it took to oust the term Malta fever, although it has taken on almost world-wide distribution as undulant fever. Bullis fever (Lone Star fever) has been moved, as already mentioned, from the chapter on typhus group of fevers and placed later, with Colorado tick ever after dengue and an account of Rickettsialpox has been added. In the plague chapter (Chapter XI) more has been said about meningeal plague and there is an addition on treatment by antibiotics. In chapter XIII, the organism of tularaemia is throughout spoken of as *Pasteurella tularense*; apart from the false concord, the organism is now classed with *melitensis* and *abortus suis* as a *Brucella*. Similar false concords are seen in *Salmonella paratyphosum A*, *B* and *C* (p. 325). Chapter XVII contains a much better map of the geographical distribution of yellow fever in Africa and another of this disease in S. America is new. A very welcome addition is the list of animals which may be concerned in the transmission of yellow fever; also the list of transmitting mosquitoes and other arthropods has been amplified.

In these days when modified smallpox is not uncommon, the table on p. 415 giving the differentiating points between variola and varicella will be useful. Chapter XXV on Sun- and Heat-stroke has been to a great extent rewritten and additions have been made to the avitaminoses section; particular attention may be directed to vitamin B_1 and to Wernicke's encephalopathy and nutritional retro-bulbar neuritis.

The excellent coloured plate of the Intestinal Lesions in Amoebic and Bacillary Dysentery again finds place, but still in the wrong place, in the Pellagra chapter. In the dysentery chapter a useful addition is the insertion of paragraphs on modern views on the treatment of amoebiasis. The terms *Bilharzia* and Bilharziasis have been discarded in favour of the correct *Schistosoma* and schistosomiasis. Leprosy has been classified in accordance with the 1946 Rio de Janeiro modification of that of the Cairo Congress of 1938. The illustration on p. 652 on chromoblastomycosis of the feet is a much better one than that of the previous edition and there is an additional picture of *Coccidioides immitis* infection of the liver. Chapter XXXVII on encephalitis has been enlarged and practically rewritten. The chapter on Dhobie Itch (chapter XLI) contains additional remarks on treatment of *Tinea cruris* infection. The editor has considered in the aetiology only the fungoid form. Reference ought certainly to be made to dhobie mark dermatitis, produced by fluid from the nut of *Semecarpus anacardium*, the ral or bella gutti tree, called *Chola gutti* in Assam and *Chela* in India, and used by dhobies for marking clothes for laundering. It contains strong vesicants, withstands repeated washings and

causes local pruritus with subsequent dermatitis, erythema, vesiculation, oozing and crust formation. Another name for the juice is *thitau anol*.

The illustration of chiggers in the sole is better and clearer than in the previous edition. The vexed subject of tropical eosinophilia (not ensinophilia, as in this and the previous edition) has been brought up to date, but should it be classed as a "local disease" since the editor himself states that it occurs in India, "Ceylon, North West and Central Africa, Tanganyika, China, the Philippines, Samoa, S. United States and other places"?

The remaining subjects may be more briefly referred to. In the hookworm section, thymol, beta-naphthol and eucalyptus oil have been dropped from treatment, but a useful paragraph on assessing the results of treatment has been inserted. Two additions have been made to the vegetable poisons, namely Flax Darnel (*Lolium temulentum*, not *Lolium temilentum*) and *Catha edulis*. Tick paralysis (p. 854) is now included with animal poisons instead of, as before, receiving incidental mention in the chapter dealing with tick typhus. Much work has been done on the Rh factor (chapter L) during the past two years and the subject is becoming very complicated, but the brief statement contained in the previous edition and repeated in the present will suffice for the general tropical practitioner. It warns him that there is such a thing and that it may be a risk in transfusion. This chapter contains a useful addition on Replacement Therapy. Penicillin, as mentioned earlier, has now a chapter to itself instead of being spoken of in the treatment of various conditions—amoebiasis, rat-bite fever, tsutsugamushi disease, etc. The same applies to insecticides, especially DDT, its methods of use and its applications. In the list of drugs used in tropical diseases space has been saved by omission of the graphic formulae which were given in the 12th edition, but which convey little to the average reader; also the drugs are now in alphabetical order which makes for ease of reference. Figure 220 (p. 913) is new and is an excellent graphic schema of the complete life-cycle of the mammalian malaria parasite based on the work of Shortt and Garnham; the succeeding figure depicting the pre-erythrocytic cycle is also new and very clear. *Trypanosoma rangeli* is another addition, with a picture of forms in culture from the peripheral blood. We are sorry to see the beautiful plate of human intestinal protozoa of the 12th edition, depicted by the skilled brush of the editor, replaced by a much cruder production in the present. The pages with the legends of the figures, now between pp. 930 and 931, should be between 932 and 933 and so face the plates to which they refer and not, as now, facing the schema of spirochaetes. In the section on Medical Entomology, the paragraphs on tsetse control measures have been amplified.

The reviewer would like in conclusion to repeat what was said of the previous edition: "The Editor is to be heartily congratulated on the successful accomplishment of a Herculean task" and to add that the general set-up—the paper, the print, and the illustrations—is in all respects better and that the new edition as far surpasses the last as the last surpassed in excellence its predecessor and Manson remains still "the best one-volume work on tropical medicine in English and probably in any language". *H. Harold Scott*

JORDAN, H. [M.B.E., M.R.San.I. etc.]. **Tropical Hygiene and Sanitation. A Course of Study and a Reference Book for Sanitary Inspectors in the Tropics. With Notes on Communicable Diseases and their Prevention** by J. P. MITCHELL, C.B.E., M.D. **and on Medical Entomology** by G. H. E. HOPKINS, O.B.E., M.A. (Cantab.). 2nd Edition. Baillière's Elementary Tropical Handbooks. pp. xii–357, 100 figs. 1950. London: Baillière, Tindall & Cox, 7 & 8 Henrietta Street, W.C.2. [5s.]

The matters a reviewer considers in reading a book of this type include the object of the author, the extent to which it is achieved, whether object or method could be improved upon, and the general presentation of the subject.

This book is intended primarily for the use of Africans in training for the Sanitary Inspector's Certificate of the Royal Sanitary Institute. It is emphasized that tuition must accompany reading, and that the book cannot be taken alone. The syllabus of the examination is given in an appendix, and all the subjects required, except Anatomy, Physiology and Office Routine, are covered in the text. They are covered in an imaginative manner, the author has incorporated as much as is possible of African practice and experience in teaching for a syllabus based on European needs. The chapter on Building Construction starts with instruction for the building of a simple house suitable for African conditions and largely restricts itself to types which might be encouraged in Africa. Medical Entomology is ably handled with good description of the important disease vectors and their life history, and though the author fails to mention it in the Contents list, methods of catching, surveying and destroying mosquitoes are well described, including adequate account of the use of residual insecticides.

Criticisms of the treatment of the subject are of course possible. Simple sewage disposal methods are far too sketchily described, with a passing approval of the bucket system before going on to the standard talk of traps and siphons dear to the European syllabus, and which it may be hoped will at some time be the most important part of African sanitation, but not yet. The methods of rat-poisoning described are antiquated, and no mention is made of either DDT or vaccine in plague control ; the former would be an important part of the sanitary inspector's activities. There are many misprints, five on page 290, which detract slightly from the pleasure of reading. As a whole, however, the book achieves its aim in a creditable manner.

So long as training is ruled by a particular syllabus, a text-book must answer the general form of the one under review, but one cannot help hoping for the time when a more liberal and modern syllabus will be substituted. The chapter on Air and Ventilation is necessary and includes formulae and methods essential for an examination but for few other purposes in Africa, and the same may be said of several other chapters. A revised syllabus should surely start with a rational classification of diseases, a statement of the environmental factors which favour them, leading naturally to a statement of how the sanitation can control environment. The author has, however, been as liberal as his terms of reference permit and his book should be of real value throughout Africa.

G. Macdonald

BLACKIE, W. K. **Child Health in Warm Climates.** Foreword by Sir Godfrey HUGGINS, P.C., C.H., K.C.M.G., F.R.C.S., Prime Minister of Southern Rhodesia. pp. x+182. 1950. London, New York & Toronto : Longmans, Green & Co. [7*s.* 6*d.*]

The chapter on sleep is excellent. The author recommends that, in the daytime, the child should be placed in his cot, under a mosquito net in some shady spot. As he remarks, there is a tendency to overclothe a baby sleeping in the open. [In certain parts of the tropics and sub-tropics it is not always safe to trust to shade from trees and some form of canopy over the cot may be advisable.] Restless nights and disorders of sleep are shortly but adequately described.

The chapters on diet are very well written, and the functions and different varieties of vitamins are well described. This part of the book is full of useful information. As the author remarks, it is seldom [if ever ?] advisable to give raw milk, and some form of sterilization is necessary. In some cases the use of dried milk products is justified. [The reviewer has found " Cow and Gate " a very satisfactory preparation.]

The author thinks that there is a widespread tendency to underrate the dangers of exposure to the tropical sun in childhood. The sun's rays are grouped into the following categories. (1) The chemical or short rays. These exert a tonic or stimulating effect and also play an important part in the formation of vitamin D in the skin, so constituting a powerful safeguard against all forms of deficiency in this vitamin, especially against rickets. Sunburn is caused in those not acclimatized and in cases of prolonged exposure reaction may be very severe. Freckling, chronic dermatitis and urticaria may also occur. (2) The luminous or medium length rays. These may cause glare conjunctivitis and headache. (3) The red and infra-red, or long heat rays. These may cause disorders grouped under the general heading of heat stroke. Regulation of the body temperature is well described and heat hyperpyrexia, heat exhaustion or syncope and heat cramp are described. [As regards the former the reviewer, who has had some experience of this condition in Iraq and the Persian Gulf, is not quite in agreement with the treatment recommended, *viz.*, placing the patient on a bed covered with mackintosh sheeting, rubbing with ice and wrapping the patient in an ice-cold sheet etc. Use of a fan is always desirable. A better treatment suggested is : (1) strip the patient, (2) place naked on a native charpoy under a fan, (3) spray with a fine spray of iced water. This brings about a rapid fall in body temperature, and a careful watch must be kept on the rectal temperature ; treatment must be stopped when this has fallen below 102°F., otherwise dangerous collapse may occur. At the same time quinine should be injected pending blood examination; indeed it has been affirmed that heat hyperpyrexia is due to nothing more than subtertian malaria on a very hot day. Of course ice and fans may not be available.]

The questions of housing and clothing are well dealt with and further research on house construction in the tropics is urged. It is important to protect the child's head from the midday sun, but this does not mean that every white child must be shut away from the sun from dawn to dusk.

Care of the skin, the hair and scalp, of the mouth and teeth, regulation of the bowels, and care of food and drink are well described. Drinking water should always be sterilized.

Diphtheria, smallpox, whooping cough, measles, scarlet fever, enteric, and their control by preventive inoculations are discussed. The author thinks that every European child should be immunized against diphtheria, smallpox and enteric fever. Other immunizing injections against scarlet fever, yellow fever, cholera and so on may be necessary under certain conditions.

Malaria is described. The prevailing infection among European children in Africa is with *Plasmodium falciparum*, and in childhood the first infection, at any rate, is almost invariably an acute one. As the author points out, this is a dangerous infection and the risk of occurrence of fulminating cerebral symptoms is always present. For this reason convulsions in childhood in a malarious district should always cause suspicion of malaria, and be treated as such in the first instance. [In acute fevers in childhood it is probably safer to commence anti-malarial treatment at once and continue this for a time even in the presence of negative blood smears.] Elimination of mosquito breeding grounds in the immediate neighbourhood of the home, control of adult mosquitoes in the house (by spraying with DDT and pyrethrum extracts) are stressed, and the treatment of malaria in native employees is recommended.

Chemical prophylaxis is discussed. Mepacrine is, on the whole, the drug of choice and the following dosage is recommended. Children up to two years 0·05 gm., two to four years—0·075 gm. [misprinted as 0·75 gm.], five to eight years—0·1 gm., eight years and over—0·2 gm. These doses should be separated by an interval of two clear days. Very rarely does this dosage cause any toxic symptoms apart from transient abdominal discomfort at the very beginning, and

any yellow staining of the skin is not permanent. The results obtained with paludrine in African malaria appear very variable and a dose of 0·05 gm. daily for children is suggested. Chronic malaria and blackwater fever are discussed, and bilharzia is described. In regions where this disease is present paddling or bathing in cool clear streams or pools must be forbidden. Water used for washing or bathing may be regarded as safe after it has been stored for three days at least. As regards hookworm, children should always wear socks and shoes and not be allowed to run about barefooted.

The symptomatic treatment of pyrexia is well described, while a warning is given that, in every case of fever, malaria must always and constantly be kept in mind. The differential diagnosis of convulsions is discussed, and here again the ever present possibility of these being due to malaria is stressed, while worm infections, especially with *Ascaris lumbricoides*, are given as a common cause.

The different varieties of croup are described, and laryngeal diphtheria and impaction of a small foreign body in the larynx are discussed. Vomiting, diarrhoea, gastro-enteritis and bed-wetting are reviewed. "Acute liver upset" (ketosis) and its treatment are well described.

[This is a really excellent little book, full of useful information. As Sir Godfrey Huggins says in his foreword, it should be in the hands of every Child Welfare Worker, Hospital Nurse, Educationalist and Practitioner of Medicine new to practice in the tropics. Indeed it might well be supplied to all new entrants to the Colonial Medical Service.] *C. F. Shelton*

ZOOLOGICAL RECORD, Vol. 84. **Being the Records of Zoological Literature relating chiefly to the Year 1947.** Compiled for the Zoological Society of London by various Recorders. Edited by Malcolm SMITH. 1950, May. London: Zoological Society, Regent's Park, N.W.8. [Price £4; advanced subscription price £3 5*s*.]

The object of the *Zoological Record* is to give a reference to every article or book of zoological importance throughout the world that has appeared in the year with which it is concerned, and the present volume (84) deals mainly with the records of zoological literature published during 1947.

Each reference is allotted to one of the nineteen sections into which the *Record* is divided, and then dealt with under three headings: (1) Titles, containing complete references to all articles arranged in alphabetical order of the authors' names; (2) Subject Index, giving a detailed analysis of the subjects dealt with in each article; (3) Systematic Index, comprising a list of all the animals referred to in the section concerned, including those described as new forms, arranged in systematic order. This arrangement enables the reader to find the information regarding the current zoological literature of any group under the authors' names, under specific subjects, or under the scientific names of animals.

The nature of the service provided by the *Zoological Record* is illustrated in the following excerpt, showing the way in which each title is dealt with:—

I. TITLES

567—Mulligan, H. W. & Sommerville, T. Malaria in the Malabar Squirrel. Indian J. Malariol. **1**, 1947, pp. 329–335, 30 coloured figs. on 1 pl.

II. SUBJECT INDEX.

STRUCTURE.

Sporozoa:

New *Plasmodium* of Squirrel, MULLIGAN & SOMMERVILLE **567.**

ECOLOGY.

Parasitism : HOSTS—

Mammalia : *Sciurus indicus malabaricus,* blood (India) ; *Plasmodium vassali* var. n. *ratufae* (Spor. Haemospor.) MULLIGAN & SOMMERVILLE **567.**

III. SYSTEMATIC INDEX.

3. SPOROZOA. (*c*) **Haemosporidia**

Plasmodium vassali var. n. *ratufae* from Indian squirrel *Sciurus indicus malabaricus,* MULLIGAN & SOMMERVILLE **567.**

The individual sections of the *Zoological Record* are now issued separately as soon as they are ready, and may be obtained by application to the Zoological Society of London, Regent's Park, N.W.8. Those containing titles likely to be of medical and veterinary interest comprise Protozoa, by C. A. HOARE and C. D. OVEY (85 pp., price 6*s.*) ; Vermes, by S. PRUDHOE, including the flukes, cestodes and nematodes in addition to free-living worms (108 pp., price 7*s.*) ; Arachnida by E. BROWNING (86 pp., price 5*s.*) and Insecta by the Commonwealth Institute of Entomology (400 pp., price 20*s.*).

No other publication provides such a comprehensive bibliography of zoological literature, and some idea of its magnitude may be gathered by the fact that approximately 12,698 titles are dealt with in the current volume. *E. Hindle*

ERRATUM

In the paper by G. MACDONALD on "The Analysis of Malaria Parasite Rates in Infants" [this *Bulletin,* 1950, v. 47, 915–38] the following reference was omitted from the list of references on p. 937.

DAVEY, T. H. & GORDON, R. M. (1933) *Ann. Trop. Med. & Parasit.,* v. 27, 27. [*Trop. Dis. Bull.,* 1933, v. 30, 466.]

The author and editor offer their apologies to the authors for the omission from the list of references of a paper which is referred to repeatedly in the text.

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